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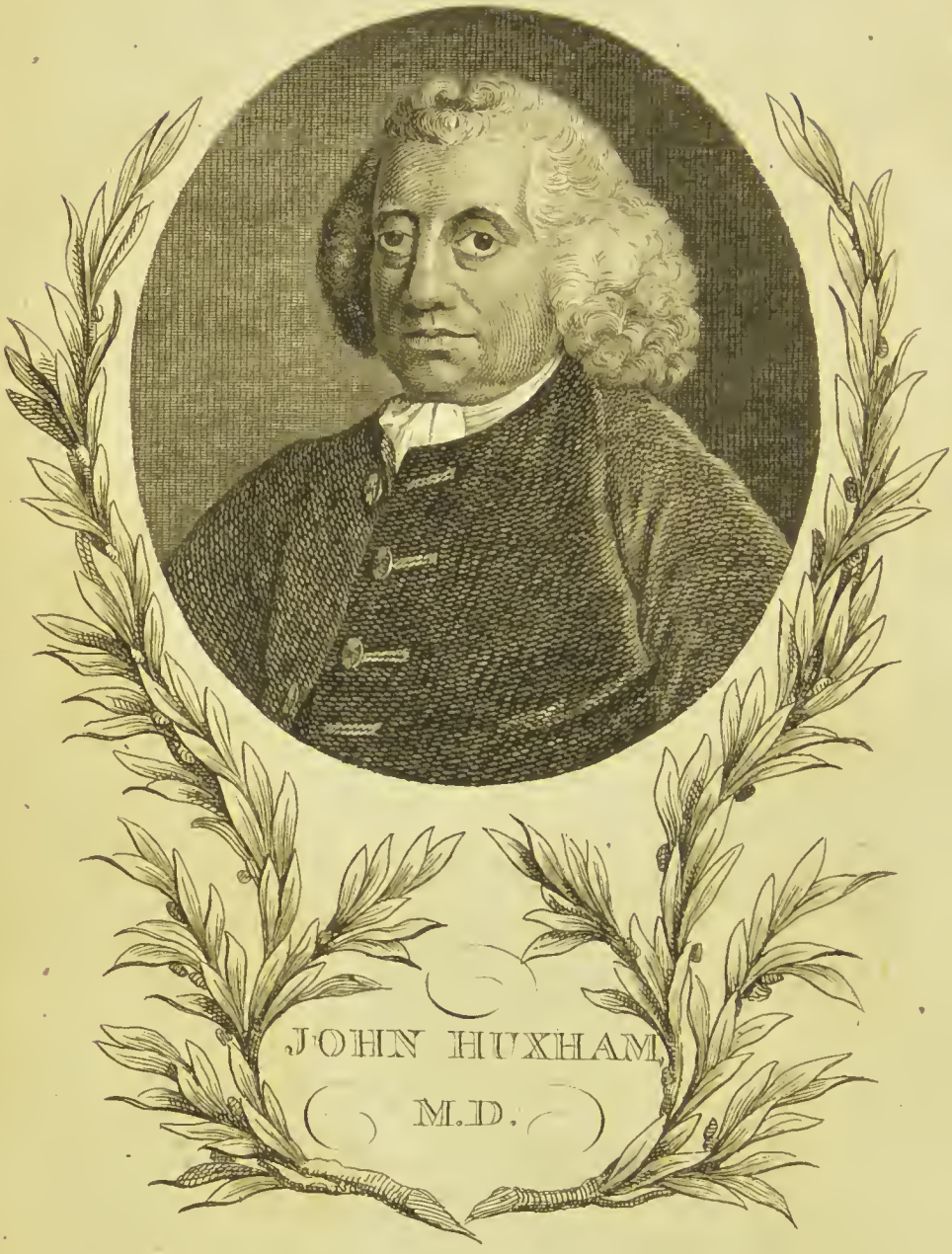
JOHN HUXHAM,
M.D.

AN ESSAY ON FEVERS.

TO WHICH IS NOW ADDED,

A DISSERTATION ON THE MALIGNANT-ULCEROUS SORE-THROAT.

A NEW EDITION.

By JOHN HUXHAM, M.D.
Fellow of the Royal College of Physicians at Edinburgh, and of the Royal Society at London.

LONDON:
PRINTED FOR G. LISTER, N° 46, OLD-BAILEY.

PREFACE.

ABOUT ten years ago I publiſhed a ſmall volume of Obſervations of the Air and Epidemic Diſeaſes, from the year 1727 to the end of 1737; and I have now finiſhed another volume of like obſervations, from 1738 to 1747 incluſive. In the latter, I think, I have been ſomewhat more careful and exact in the hiſtory of the reigning diſeaſes, and the method of cure. However, as it would have been too great an interruption to the ſeries of the obſervations, to have entered into particular diſquiſitions on the nature and cure of the ſeveral diſeaſes, there curſorily mentioned, I have reſerved them for the following eſſays; in which my way of thinking and acting as to fevers in general, and thoſe ſpecified in particular, will more fully appear; and this, I hope, will be of ſome ſervice to the younger practitioners, as theſe eſſays are the reſult of a pretty large and long experience, and the obſervations were made with the utmoſt care and diligence. Whatever be the event, I flatter myſelf they will be received as the honeſt endeavours of a ſincere well-wiſher, not only to his profeſſion, but to all mankind.

In the following eſſay, I have frequently referred to both the volumes of Obſervations, and, in the latter volume, often referred to theſe eſſays; ſo that, by theſe means, I have endeavoured mutually to illuſtrate both the one and the other.

Though I have all along ſtrictly kept cloſe to facts and repeated experiments (and where I have reaſoned from theſe, I have aimed at the juſteſt analogy) yet I have ſupported my doctrine and practice very frequently by the authority of the ancients, particularly Hippocrates. And this I have the rather done, as well knowing of what great uſe they were to me in the courſe of my ſtudies and practice; and alſo with a view of recommending their frequent peruſal to young phyſicians. But although my advice perhaps, in this matter, may have no great weight, yet I hope the concurrent judgement of the greateſt maſters in our profeſſion, will be duly regarded.

I will not take upon me to ſay a perſon cannot be a good phyſician without conſulting that great oracle of phyſic, and reading the ancients; but this let me ſay, he will make a much better phyſician for ſo doing. And I believe few, if any, ever

made any conſiderable figure in the profeſſion, who had not ſtudied them. Indeed, Hippocrates hath been accounted the very father of phyſic, and the plan which he laid down, as the baſis of all true and ſolid medicine; and it hath been conſtantly held in the higheſt veneration by all his ſucceſſors; at leaſt by all thoſe who were capable judges of the matter. The reaſon of which is evidently this, that he ſtudied nature with the greateſt care and aſſiduity, and copied and followed her too, with the greateſt exactneſs; ſo that his obſervations have been found perfectly juſt through all ſucceeding ages.

It is not in phyſic only, but in ſeveral other arts, that the ſtudy of the ancients is of the utmoſt advantage, and is univerſally allowed to be ſo. Whoever would excel in poetry, ſculpture, ſtatuary, &c. muſt always conſult the works of the ancient maſters in theſe reſpective arts, as the moſt perfect models, and moſt juſt copiers, of nature; and it is not in poetry only, but in phyſic alſo, that Horace's advice is good;

——— *Vos exemplaria Græca*
Nocturna verſate manu, verſate diurna.

In truth, the ancients were not only men of vaſt genius, but of the greateſt diligence, and unwearied application (the Roman hiſtorians have always in the character of their great Men, *incredibilis induſtria, diligentia ſingularis*) who kept their eyes ſteadily fixed on what they would deſcribe, and gave us the true picture and naked truth of things, which is infinitely more beautiful than all the affected daubing and flouriſhes of a modern luxuriant imagination. The more juſt the deſcription, always the more excellent. What is a portrait good for, that is not like the original? As nature herſelf, the more accurately viewed, is the more admired, ſo he that gives us the trueſt copy of her face, will ever be deemed the greateſt maſter. In this Hippocrates ſo greatly excelled, that he had the united applauſe of the nations around him, nay, they even paid him divine honours; for by this he was enabled to heal, as well as to know and deſcribe diſeaſes. I am fully perſuaded, had this method been ſtrictly followed by ſucceeding phyſicians, the art of healing would have long ere this time been carried to a much greater height than it is at preſent; which hath by no means kept pace with the many and great diſcoveries that have been made ſince (eſpecially within this and the laſt century) in natural philoſophy, anatomy, the *materia medica*, and chemiſtry. Indeed, as man is by nature mortal, it is impoſſible that art can make him immortal; but ſurely it is very poſſible it may ſupply ſomething more exact and determinate than we have at preſent.

From

From the days of Galen, and indeed long before, vain hypothesis, the love of novelty, the fashion and faction of physic, too often led its professors devious, and attached them to error; and it is too well known, the same misfortunes still attend us. However, it must be acknowledged that all the sober, regular, judicious practice, hath been always consonant to the Hippocratic doctrine; as hath been shewn at large by the learned Dr. Barker, in his late Essay, to which I refer the reader, and to Dr. Glass's ingenious Commentaries for a Scheme of the Practice of Hippocrates.

I am so far from blaming a rational theory in physic, that I think it the basis of all just and regular practice; but then it should be, as Hippocrates adviseth Κατὰ φύσιν θεωρέων.* If ever physic is to be improved, it must be in such a manner, and not by chimerical hypotheses, nor rash unwarrantable quackery. A diligent study of the ancients therefore, and a thorough acquaintance with the laws of the animal œconomy, as rationally delivered by some of the moderns, should be the business of every physician; but some are more expeditiously popped into the world. To be the favourite of a great man (or, what is rather better, a great woman) to be the tool or fool of a party with a splendid equipage, and no small share of assurance; these are qualifications which finish the doctor, to the reproach of the profession, and the danger of the society.

Celsus hath been justly stiled the Latin Hippocrates, not only as having translated an infinite number of passages from the divine old man in his works, but also as having generally followed his method and medicine. His Latinity is most elegant, his physic and surgery surprisingly just. †

No

* *De Vict. acut. Sect.* xlvi. *Edit. Lindeni.*

† Although I am far from thinking that Celsus was a practitioner of physic, in the common sense of the words, as Asclepiades, Themison, and Cassius were; yet he had certainly well studied it, and diligently perused the most considerable and best authors then extant in physic and surgery—chiefly, perhaps, as a philosopher, who made the whole study of nature his business, like the sages of old, by whom, as Celsus himself says, "*medendi scientia sapientiæ pars habebatur, ut et morborum curatio et rerum naturæ contemplatio sub iisdem auctoribus nata sit—ideoque multos ex sapientiæ professoribus peritos ejus fuisse accepimus.*"—And therefore Columella very justly stiles him *universiæ naturæ vir prudens*—for indeed he not only wrote of medicine, but of agriculture, the diseases of cattle, &c.

That he was even conversant in the practice of physic and surgery, is pretty evident from his books *de Medicina*, in which he gives a very judicious account of diseases, and the method of curing them, and very exact and particular directions in the chirurgical operations, even to the minutest circumstances of dressing and bandages; insomuch that it seems very probable that he actually performed himself, or at least had been very often present at such operations.

Besides, he appears to have been very well acquainted with the *materia medica*, and

No one hath more justly followed Hippocrates than * Aretæus Cappadox, so far as to have affected his very words and

and method of composition, and hath carefully laid down particular directions relating thereto, and a precise account of the weights and their subdivisions, by which he would have the medicines compounded.

It may be said, indeed, that he compiled the chief part of this work from the most celebrated authors that preceded him—unquestionably he did so; but then he hath, in very many places, interposed his own advise and opinion, and that too very often contrary to the sentiments and directions of his most favourite authors, Hippocrates and Asclepiades.

Upon the whole, I cannot but think the attentive reader will find in Celsus a great number of passages, which will incline him to believe that that author was very well versed in the practice of physic and surgery. Several such the learned Dr. James Grieve hath cited in the preface to his translation of Celsus—and I beg leave to point out a great many more; but to avoid being tedious, shall only set down the number of the pages in Almeloveen's edition of Celsus (with which the Paduan, published by Vulpius, 1722, exactly tallies) where passages to this purpose may be found—had it been necessary, I could have added many more.

Page 4—19—26—29—30—81—89—90—91—96—111—122—129—140—144—150—152—159—165—176—181—194—197—200—204—227—230—232—242—249—263—271—296—318—332—338—360—364—393—405—406—408—409—416—426—440—441—446—458—475—477—509—512—517—528—530—546.

* It is pretty surprising that none should take notice of Aretæus before Aetius Amidenus, in the fifth century; he is, indeed, named in the Euporista attributed to Dioscorides, but few think that piece to be the genuine work of that author; neither Galen, Cælius Aurelian, nor Oribasius, mention him, though so particular in enumerating all the physicians of note, antecedent to, or contemporary with them.—And yet Aretæus seems to have been a very considerable practitioner, and a man of great learning and judgement. He affects a very singular stile, using many obsolete words, Homeric and Hippocratic phrases, and the Ionic dialect; which, at the time he wrote in, was almost entirely disused; for notwithstanding the conceit of Vossius, he undoubtedly did not write till after the time of Nero. All this, one would think, should have made him remarkable; especially if he practised in or near Rome; which is not improbable, as he advises Roman wines to the sick, particularly the Falernian, Surrentine, Signine, and those of Fundi.

But farther, Galen and Aetius quote from Archigenes several passages, which are exactly the same as to sense, doctrine, method of cure, and manner of expression, with what we find in Aretæus; only the latter gives them the Ionic turn.—They both coincide in recommending some particular medicines, which are scarce to be met with in any others, particularly the external use of cantharides; which I think is not to be found in any preceding author, except Celsus.

Did Archigenes then borrow from Aretæus, or the latter from the former?

It is certain Archigenes practised at Rome with a very great reputation, was a very celebrated physician and author, and as such is referred to by Juvenal, Galen, Cælius, Oribasius, Aetius, &c.—He is strictly criticised by Galen, sometimes censured, sometimes commended, but never reckoned a mere compiler.—Aretæus, on the contrary, is mentioned by none but Aetius and Paulus Ægineta; nay, which is not a little to be wondered at, he is not so much as found in Photius's Bibliotheca.—This is really strange, and not easily accounted for, and would incline one to think that Aretæus borrowed from Archigenes; or rather transcribed and new modelled him, giving him the Hippocratic

and ſtile. His deſcriptions of diſeaſes are admirable, and his method of cure greatly judicious.

Galen ſhould be read by all that would conſult the moſt laboured and exact commentator upon Hippocrates; beſides, he abounds with an immenſe number of fine and uſeful obſervations in all parts of phyſic, and was the firſt that gave us any particular account of the pulſes, their difference and ſignification. It is pity there is ſo much of the Peripatetic and Periphraſtic in him. The world would probably receive a judicious abridgement of his works with no ſmall ſatisfaction.

Had Cælius Aurelianus written in the ſtile of Celſus, he would have been an invaluable author; as it is, we are vaſtly indebted to him for the whole doctrine of the Methodiſts, particularly of the judicious Soranus; as well as for the ſentiments of the ancients on very many diſorders, which otherwiſe would have been wholly loſt to us. Notwithſtanding his barbariſms, his deſcription of diſeaſes is moſt juſt and admirable.

One of the ancients more I would particularly recommend, that is, Alexander of Trallis, who, in moſt things indeed, follows Hippocrates and Galen, and generally gives them the epithet of θειότατοι. But yet he hath an infinite number of uſeful remarks of his own, abounds with many excellent medicines, and writes in a very judicious and regular manner.

In the following eſſays I have not ſo much aimed at a particular and methodical diſſertation on the diſeaſes treated of, as to give a few hints and neceſſary obſervations as to their nature and cure, for this would have made the work voluminous, which, I fear, is even now not a little tedious.

I have given few or no *formulæ*, or preſcriptions; for, as Hippocrates ſays, he that knows the diſeaſe, knows what is proper to cure it. When a phyſician knows whether ſtimulants or anodynes, relaxants or reſtringents, attenuants or incraſſants are indicated, he can be at no great loſs how to ſerve himſelf of proper drugs, out of the vaſt *materia medica*, which we at preſent abound with. He ſhould ſelect a few of the

cratic diction and Ionic dialect.—Poſſibly Aretæus might do by Archigenes, ſomething like what Cælius Aurelin, not long after, did by Soranus. But, if ſo, he hath vaſtly much better græciſed Archigenes, than Cælius hath latiniſed (as he calls it) Soranus.—Upon this ſuppoſition, we need not wonder at finding the Roman wines recommended in Aretæus, though he might practiſe and write in Cappadocia, or any where elſe, at the greateſt diſtance from Rome. But theſe are my poor conjectures. Be the matter as it will, in Aretæus we have a moſt valuable work, a moſt accurate deſcription of diſeaſes, and, in general, a very proper and judicious method of cure; and it is greatly to be lamented that the work comes ſo maimed to us.

the moſt effectual for his uſe of each ſort, and ſtick to them, and not run into the immenſe *farrago*, which ſome are ſo fond of. By ſo doing, he will ſoon be acquainted with their real virtues and effects, and readily diſtinguiſh between the ſymptoms of the diſeaſe, and thoſe cauſed by the medicines, which is a thing many times of no ſmall importance. I have really ſeen in private practice, and ſome public writings, ſuch a jumble of things thrown together in one preſcription, that it would have puzzled Apollo himſelf to know what it was deſigned for: not but that there are frequently ſuch complications (and contra-indications too ſometimes) in diſeaſes, as makes ſome degree of combination and contraſt in a medicine neceſſary.

But a formula, or recipe, as it is called, can be of very little ſervice. Twenty or thirty grains of rhubarb ſhall purge ſome as much, as twice the quantity of jalap will others. One grain of Theban extract, or twenty drops of the tincture, will doze one as much as triple the doſe will another. Beſides, the conſtitution and manner of living of the patient muſt be conſidered, in preſcription, as well as the diſeaſe. A ſober, temperate perſon, or one that lives chiefly on milk, vegetables, and water, will by no means bear ſuch warm medicines, compound waters and ſpirits, as may be quite proper for thoſe who have dealt largely in ragouts and ratafia. But this is obvious, and ſo is this deduction, that we ſhould always begin with ſmall, or very moderate doſes of all kinds; and that not only the phyſic, but the drink and diet of the ſick alſo ſhould be prudently regulated; for ſurely what we uſe by ounces and pounds, cannot but conſiderably affect us, as well as what we take by grains and ſcruples. Hippocrates, and the ancients, were very careful in this particular, and very exact in preſcribing a regimen; and in this reſpect, likewiſe, young phyſicians would do well to conſult them. As for thoſe who will neither read nor reaſon, but practiſe by rote, and preſcribe at a venture, I muſt ſeriouſly adviſe them, at leaſt, to peruſe the ſixth commandment.

AN ESSAY ON FEVERS, AND THEIR VARIOUS KINDS.

CHAP. I.

OF THE MOST SIMPLE, MORE COMPLEX, AND INFLAMMATORY FEVERS.

THE great Boerhaave, in his admirable *Aphorism de cognoscendis & curandis Morbis*, begins with the diseases of a simple fibre; and indeed the only method to attain to any considerable knowledge in any science, is to begin from the very elements of that science; for whatsoever is most simple is more easily understood, than that which is more complex; method and perspicuity are the natural consequence of such a procedure.

Thus, in examining into the nature of fevers, it seems most proper to consider the most simple of the kind first. Let us suppose then, a person, both as to his solids and fluids, in perfect health, engaged in violent exercise, as by running, or the like: this, if long continued, will greatly encrease the velocity, friction, and heat of the blood, which, when considerably above natural, are called a febrile state. Here is then the most simple fever, arising from nothing but the encreased action of the solids on the fluids, and the re-action of the latter on the former; which soon subsides on the cessation of the motion, or violent exercise.

Let us next suppose another perfectly healthy person, exposed to cold moist air, by which his perspiration may be considerably suppressed; hence will follow an encreased quantity of humours, and an encreased effort of nature to throw them off, and remove the obstructions: whence a feverish habit will follow, which, however, frequently soon wears off, by the kindly relaxing warmth of a bed, or the like, assisting nature's endeavours.

A third, of an equally good constitution, drinks too largely of wine, or other spirituous liquors, which, encreasing the quantity of humours, and also the motion of the blood by its stimulating quality, produces a fever, which in like manner soon goes off, by abstinence, &c.

In any of these cases, only a simple *ephemera*, or short fever, is generated. But if, in the first case, the blood was so violently agitated and rarefied, as that, by its great *impetus*, and dilatation of the vessels, some of the red

globules are forced into the *ſerous arteries*, an inflammatory obſtruction would be formed: as we ſee even externally, when the red globules are forced into the veſſels of the *tunica conjunctiva* of the eye, where only *lymph* or *ſerum* ſhould paſs. And if withal the velocity and heat of the blood ſhould be ſo great, as to diſſipate much of its thinneſt part; the remainder would be left groſs and thick, and leſs fit for a free circulation through the *minima vaſcula*; and the very ſerum would be turned into a kind of jelly. For a heat, not much greater than the heat in a common fever, will coagulate the ſerum of the blood; the conſiſtence of which jelly will be in proportion to the violence and duration of the heat. Here then, I ſay, by the mere ſimple accelerated motion of the blood, an inflammatory fever would be produced, of much longer duration, and more dangerous conſequence. If the inflammation ſeizes the lungs, a peripneumony; if the *pleura*, a pleuriſy; if the brain, or its membranes, a phrenzy is generated. And theſe diſorders prove much more ſevere, where, antecedent to this violent motion of the blood, there was a great ſtrength of the fibres, and a great denſity and quantity of blood.

If in the ſecond caſe, the obſtruction of the pores and perſpiration be very conſiderable, the fibres ſtrong and tenſe, the blood much in quantity, and very thick, fevers of the ſame kind enſue.

If in the third caſe, to tenſe fibres and much viſcid denſe blood, a great quantity of wine, or other ſtimulating liquors, be added; both the quantity and velocity of the blood may be ſo greatly encreaſed, as to bring on a dangerous acute fever, which too often follows drunken debauches.

Now as any one of the above cauſes may ſingly produce a fever, on the concurrence of two, or all three, a more violent one, *cæteris paribus*, will ariſe. Thus, from cooling too ſuddenly after vehement exerciſe, as by expoſing the body to very cold air, and ſtopping the ſweat and perſpiration at once, a very dangerous inflammatory fever will come on, which will be much more violent, if the blood had been heated and encreaſed by a large quantity of any ſpirituous drink immediately before. By the bye, nothing ſo effectually carries off the ill conſequences of a drunken bout, as keeping warm, and lying long in bed, to ſoak it out, as they call it.

Now by conſidering the proximate cauſes of theſe fevers, the method of cure is very obvious, which is by leſſening the velocity, quantity, and acrimony of the blood as ſoon as poſſible. But nothing ſo ſoon abates the too rapid motion, quantity, and heat of the blood, as bleeding; for by this means the red globules of the blood and *vis motrix* are leſſened. By bleeding *ad deliquium*, as Galen, and ſome of the ancient phyſicians, did in inflammatory fevers, the blood's motion almoſt quite ceaſes for a ſhort time.

Bleeding therefore is certainly the firſt intention in the cure of fevers, that ariſe from too great a quantity, and too rapid a motion of the blood; and the longer it is neglected, the more viſcid and acrimonious is the blood rendered, by diſſipating its more thin part, condenſing the red globules, and heating the ſerum to ſuch a degree, as to turn it into a kind of jelly. And by exalting the animal ſalts and oils to a greater and greater degree of acrimony (which is always in proportion to the intenſity and duration of the heat) the whole maſs grows putrid at length, and unfit for animal uſes. Beſides, whatever obſtructions may be formed, either in the extreme branches of the *ſanguine*, or begining of the *ſerous arteries*, are apt to be more and more radicated by the too violent motion of the blood. So that the neglect of bleeding at the beginning of any acute diſeaſe, is very often never to be compenſated in the ſubſequent *ſtadia* of the fever; when the *impaction* of the obſtructing matter

is

is so far advanced, and the thickness and viscidity of the humours so great, as to elude the force of all manner of attenuants and diluents.

In general, the quantity of the blood to be taken away, is to be determined by the strength of the patient and his pulse; by the intensencss of his fever, heat, and the vehemence of his symptoms as to pain, difficulty of breathing, &c. Nay, the very bulk of the person is to be considered also; for certainly, *cæteris paribus*, a big strong man can bear to lose more blood than a small strong man. It is safer, however, to take away too little than too much at a time, as the operation may be so soon and so easily repeated, and as often as may be indicated. If the pain, heat, difficulty of breathing, &c. abate not after bleeding, it shews the necessity of drawing more blood.

And here let me caution the younger practitioner not to be deceived by an oppressed pulse, which is often the consequence of too great a fulness of blood: this is manifest by the vibrations of the artery becoming more free and strong after bleeding in such cases, as daily experience evinces. If he is doubtful in the case, let him apply his finger to the pulse in the other arm, while the patient is bleeding, and if he finds it flag considerably, flutter, or intermit, it is time to desist; if it beats stronger and more open, he may proceed with safety and success. There are, indeed, some very apt to faint on bleeding, from a natural laxity of the fibres, and a want of that due elasticity which should contract the vessels in proportion to the evacuation. These should be bled in a recumbent posture, and the orifice may be frequently stopped for a short time, whereby fainting will be in a great measure prevented. These persons, though they have too lax fibres and vessels, are often plethoric, and of course require bleeding; especially where the load of the humours begins to overbear the power of the heart, which is the common case in an oppressed pulse.

Bleeding not only lessens the quantity and velocity of the blood, but it also makes room for the entrance of diluting liquors into it. Proper dilution is absolutely necessary in all fevers, especially in the ardent and inflammatory; for in these the blood is rendered too thick and viscid, by the dissipation of the thinnest parts of it, and the remaining serum is more and more incrassated, or jellied, by the great and continual heat: so that cooling, thin, diluting liquors, are necessary to supply the continual waste of the lymph and serum, and to keep the whole mass in a due degree of fluxility. These, in general, should be of the acescent, and somewhat also of the saponaceous kind. Of the former, as they are very cooling, and prevent the encrease of the alcalescent acrimony of the humours: which would otherwise be continually advancing by the great friction and heat of the blood; for the animal salts are greatly exalted, and made more corrosive, by the feverish heat, and the animal oils are by the same cause turned rancid at length, and highly acrid. The sweetest oils, or butter, by great heat, become vastly caustic. Of the latter, as they not only dissolve the *lentor* better, but also keep the humours more properly mixed, by uniting the salts, sulphurs, and waters, more intimately with the blood. I have often known pure water, drank plentifully in acute fevers, rendered almost as pale and insipid as when drank (which, by the way, is a very dangerous symptom.) Water, as water, will not unite with oily liquors; so that when the serum of the blood hath been jellied by heat, and its oily part exalted and encreased, by melting down the fat in the *membrana adiposa*, &c. it is no wonder that plain water neither mixes well with the blood, nor proves an effectual diluent. Hence, therefore, follows the necessity of mixing something saponaceous with it, as sugar, syrup,

jellies, or rob of fruits, as currants, raſberries, cherries, or the like. Juice of lemons, or oranges, by mixing a little ſugar with it, and a proper quantity of water, becomes a very grateful drink, and anſwers the intention of a diluent, both acid and ſaponaceous.

Beſides the uſe of diluents as to the humours of the body, no ſmall advantage will ariſe from them as to the fibres and veſſels, which they tend to relax; eſpecially when they are drank ſomewhat warm. Now too great a tenſion of the fibres, &c. is naturally concomitant to great velocity, heat, and denſity of the blood, which always attend, or rather are the very eſſence of, an inflammatory fever. Every one knows what tepid bathing will do externally; and it may be eaſily ſuppoſed, that ſubtepid diluters internally will have an analogous effect. In all theſe views, the blood is rendered leſs rapid, leſs viſcid, and, in conſequence, leſs hot; which are matters of the higheſt import in the cure of ardent and inflammatory fevers. It may be added, that obſtructed capillaries, and obſtructed perſpiration, are by ſuch means moſt ſafely and effectually remedied, the humours being rendered fluxile, and the *minima vaſcula* permeable. For it is to be noted, that where gentle and general ſweats follow plentiful dilution, with liquors of a cooling relaxing nature, they are commonly critical, and ſoon carry off the fever. I ſay gentle ſweats, for profuſe ones ſhould never be encouraged in the beginning of fevers, as they drain off the thinneſt part of the blood, and leave the remainder too thick, viſcid, and apt to obſtruct. In a particular manner I have often obſerved them of the higheſt ill conſequence in the beginning of pleuriſies, peripneumonies, and the ſmall-pox. And for the ſame reaſon, profuſe diſcharges by ſtool, and thin urine, are hurtful.

But the moſt pernicious method of raiſing ſweats in the beginning of fevers, is by giving hot volatile alexipharmic medicines, ſtoving up the patients in hot air, and ſmothering them almoſt with loads of bed-clothes; for theſe encreaſe the motion and heat of the blood already too violent, and add fewel to the fire: nay, very often they are ſo far from raiſing ſweat, that they prevent it, by hurrying on the blood with too great rapidity to give off any natural and regular ſecretions. It is well known, the higher the fever, the leſs the excretions by ſweat, urine, ſaliva, and the like.

Certainly, if mere encreaſed motion of the blood can bring on a fever, whatever will encreaſe that motion, will continue and augment it, which theſe methods and medicines are known to do.

For theſe reaſons alſo bliſters, which throw an acrid ſalt into the blood, and greatly ſtimulate the fibres, are very improper in the beginning, at leaſt, of all ardent and inflammatory fevers. Yet how often do we ſee, in the common practice, a patient bled largely, then bliſtered, and forthwith put under a courſe of hot alexipharmic boluſſes, cordials, &c.? Which is juſt as rational as to pull out part of too large a fire firſt, and then forthwith endeavour to quench the remainder, by throwing on gunpowder, or ſpirit of wine; or to lay on whip and ſpur to a horſe on the fret, when we would ſtop him, which is really the caſe in bliſtering, where the oſcillatory power of the veſſels is too great, and the motion of the fluids too rapid.

After bleeding, cooling, emollient, laxative clyſters are of very great uſe in the cure of acute fevers, even at the very beginning, to bring off the indurated excrements, which frequently are pent up within the inteſtines, and to give a diſcharge to any bilious acrid matter, which might otherwiſe, in part at leaſt, be reſorbed by the lacteals, &c. into the maſs of blood. Beſides, they are a kind of a warm relaxing fomentation to the parts in the *pelvis*, and lower belly, and both derive from the head and *præcordia*, and promote a diſcharge of urine alſo.

A gentle

A gentle lenient purge, likewise, is often of the greatest service, more effectually to cleanse the intestinal canal of the putrid *saburra*. But I would always advise to such as act chiefly in the *primæ viæ*, as manna, cream of tartar, sal catharticus glauberi, rhubarb, tamarinds, and the like. All drastic purgers are certainly very pernicious, and so are all the hot aloetic tinctures, pills, &c. Indeed all profuse purging is hurtful, as it drains off too much of the lymphatic part of the blood, and thickens the remaining. When nature seems to have too great a tendency that way, first a dose of rhubarb, then a little of the *species e scordio*, with a *diacodiate* anodyne, or the like, may be proper.

In very deed, little more seems necessary in the cure of ardent inflammatory fevers, than proper and well-timed evacuations, and plentiful cooling dilution, with a few nitrous medicines, and the acid saponaceous juices of vegetables; for these not only tend to keep the blood in a due degree of fluidity, but also to prevent its running into a putrid state. In giving these freely, we do but follow nature (our best guide) that earnestly demands them; for how averse soever she may be to meat in fevers, she ardently desires drink; and it is a symptom of very bad omen when she doth not, till the fever considerably abates, at least.

If, from any of the above causes, an inflammatory fever should seize a person that had an antecedent sharp state of humours, the fever would prove much the more violent; because the acrimonious salts would act as so many *stimuli*, accelerate the blood's motion, and produce a speedier and greater putrescence of it. Hence, therefore, the utmost necessity of dilution in such cases, to dissolve and wash off the salts offending (for nothing but a watery menstruum will dissolve salts) and likewise medicines opposite in nature to the peccant acrimony. But the diluters also should have something of the saponaceous in them, for reasons hinted at above; especially when the oily parts of the blood are greatly encreased by the melting down of the fat by the heat of the fever; which often happens to a surprising degree, and very suddenly, in some very fat persons, and which continually grows more and more acrid and rancid, and requires some saponaceous medium to unite it with the aqueous parts, otherwise it produces the most fatal obstructions, and highest degree of acrimony.

As to the manner of dilution, I think the sick should be allowed to drink as freely, and as often as they please, but not forced to load their stomachs with too large draughts at a time, which create a nausea, indigestion, and wind, with great anxiety and restlessness, and, in the event, vomiting or purging.

The practice of Asclepiades was in nothing more monstrous, than in denying all manner of drink to the sick for the first three days of the fever. And he is very far from keeping up to the rule he lays down, of curing *tuto, celeriter, & jucunde*; when, as Celsus says, *convellebat vires ægri luce, vigilia, siti ingenti, sic ut ne os quidem primis diebus clui sineret. Lib.* iii. *Cap.* 4. I am sure that he did not learn this from the great Hippocrates, nor from reason, nature, or experience. But this man, from a declaimer, turned physician, and set himself up to oppose all the physicians of his time; and the novelty of the thing bore him out, as it frequently doth the quacks of the present time, and ever will, whilst the majority of the world are fools!

I think smaller draughts, frequently given, the best way of dilution; for, of the same quantity of liquor drank in a certain time, more is like to be imbibed by the absorbing vessels, planted thick from the mouth to the stomach, by frequently sipping it down, than if swallowed at once in a full draught, because it is in this way more frequently, and much longer, applied

applied to these vessels. Besides, when swallowed, the action of the stomach and intestines is more effectual in squeezing it into the lacteals and mesaraic vessels, when in small quantities, than when they are, as it were, deluged with the liquor.

Moreover, dilution and relaxation may be farther carried on by emollient fomentations, tepid baths, cooling lenient clysters, &c. Bathing of the arms and hands, legs and feet, and also of the hypochondria, is of very great service in fevers of the inflammatory kind (the good effects of which I once experienced on myself) but the *fotus* should not be much hotter than the present temper of the body, which may easily be adjusted by a thermometer.

This method not only supplies the blood with moisture through the absorbing vessels, but also greatly tends to open the obstructed, and produce a general relaxation of, fibres, now commonly too rigid. In very dry *strigose* constitutions, it cannot but be of the greatest service. The skins and bladders of animals, when very dry, will transmit nothing; but, when moistened, water, &c. will pass through their pores. And the drinking frequently of tepid, emollient liquors, is at the same time a kind of internal relaxing *fotus* to the *primæ viæ*, *præcordia*, *&c.* which is of no small consequence, especially in inflammations of the lungs, pleura, &c. I shall only farther add on this head, that this was the practice of the ancients, who gave little else in fevers besides thin watery diluents, *ptisan* or barley-water, *hydromel*, *oxymel*, *&c.* and used very frequent fomentations and clysters.

As encreased velocity of the circulating humours will of itself bring on a fever, all causes that encrease the blood's motion, will encrease the fever; the strength of the fever, therefore, will be in a compound ratio of the moving powers, viz. strong tense fibres, much dense rich blood, and many acrid salts in it, which stimulate the heart and arteries to more frequent and vehement contractions. The large use of very salt and spiced meats will raise a feverish heat, even in the most healthy.

On the contrary, the weaker and more lax the fibres, the thinner and poorer the blood, the less vehement the fever. This is the case in what we call slow, or nervous fevers; which are generated by low, watery, unwholesome diet, crude washy fruit, rainy, warm, and wet seasons, long and great anxiety of mind, dejection of spirits, &c. Here, indeed, a kind of lentor, or ropiness of the humours, is also generated, and is a proximate cause of the disease; but it is not of the inflammatory kind (or what the ancients called *phlegma phlegmonodes*, which is particularly inherent in the red globular parts of the blood) for it subsists chiefly in the serous and lymphatic vessels, which hence become obstructed; and from such a poor ropy state of the blood, few animal spirits are generated, and they are irregularly secreted and distributed; hence the nervous symptoms, which denominate the fever. And yet as there are obstructions formed, the stagnant lymph grows more and more acrimonious, which brings on more or less of a fever, known by the quickness of the pulse, irregular heats, chills, &c. All the humours of the body grow more and more corrosive, the longer they stagnate; even hydropic swellings of the legs, though at first as cold as marble, become at last highly inflamed, the humours at length so very acrid as to produce an erysipelas, vesications, ulcers, &c. as is often observed at the close of dropsies.

Now as the seat of these fevers seems chiefly in the *ultima vascula*, or the serous and lymphatic arteries, and perhaps in the very origin of the nerves; and as they are always attended with too great a *flaccidity* and *torpor* of the nerves and fibres, and the obstructions lie more remote from the great road of the circulating blood; it is no wonder they are not so easily affected by medicines, and so readily removed,

removed, as if their cause lay more particularly in the sanguineous vessels. Besides, it must be considered that the nerves and fibres are not presently restored to their due tone. Hence we in fact see that these kind of fevers are both longer in forming, and much longer in being carried off, than a common inflammatory fever.

These two sorts of fevers seem to have in a great measure opposite causes, and, in consequence, very different symptoms and effects. Let us consider some intermediate febrile state, which will elucidate this whole affair. Turn we, therefore, our thoughts on an intermitting fever.

CHAP. II.

Of intermitting FEVERS.

THE common procatarctic causes of agues, are a moist, foggy atmosphere, exhaling from a swampy, moras soil, or a continuance of cold, rainy, thick weather; hence in low, fenny countries, agues are endemic, and in such seasons epidemic. By such constitutions of the air, the fibres are too much relaxed, and regular perspiration obstructed, which soon create a *lentor* of the blood, and that obstructions and some degree of stagnation in the ultimate branches of the *sanguineous arteries*; as is manifest from the coldness, paleness, and lividity of the fingers, nails, lips, &c. which immediately precede and begin the rigor of an aguish paroxysm. The blood hence recoils upon the heart, and all the powers of nature rouse up to remove the obstructions, which are soon carried off in a hot fit, in sweats, turbid urine, &c. We see a kind of aguish paroxysm brought on by bathing in very cold water; paleness, coldness, shivering, a stoppage of the blood in the cutaneous arteries, and repulsion towards the heart; you are no sooner out of the bath, than your heart, arteries, &c. overcome the resistance from the precedent constriction, and bring on an universal glow of heat. But if the person bathed be weak, the water very cold, and the continuance in it long, he may die in the cold bath; as a weakly patient may in the cold fit (which commonly happens when the disease proves mortal) the heart not being able to overcome the resistance.

If the fibres are pretty strong, the lentor and obstructions not very great, the paroxysm easily wears off by this effort of nature. But if the lentor and obstructions are great, the fibres strong and more tense, the fever runs very high in the hot fit, and is readily changed, by wrong management, into an acute continual. Indeed it is observable that some epidemic agues, in some constitutions, at first put on the appearance of ardent fevers, and then break into quotidians or tertians; and it is not uncommon for a quotidian or tertian, to be changed, by a very hot regimen at the beginning, (as volatile spirits, brandy, pepper, snake-root, &c. which are too often quacked upon the poor patient) into an inflammatory fever, with phrensy, pleurisy, or peripneumony. So that the constitution of the solids and fluids, in some kinds of agues, seems not greatly different from that of inflammatory fevers. I well remember, that the catarrhal fever, which spread through all Europe under the name of the influenza, in the spring of 1743, frequently became pleuritic, or peripneumonic; and as frequently, after two or three days, ran into a quotidian, or tertian: the difference of the constitutions of the patients, &c. thus altering the face and nature of the disease.

Sometimes quotidian, semi-tertian, and tertian fevers, are very rife and cotemporary with epidemic pleurisies and peripneumonies; as particularly in 1744.* The cold season in some constitutions bracing up the fibres so high,

* Vid. Obs. nostr. de Aere & Morb. Epidem. Vol. II. Martio, Aprili, Maio, 1744.

high, and condenſing the blood into ſuch a degree of viſcoſity, as to bring on theſe inflammatory fevers on taking cold, or other accidents; whilſt, on perſons of a more lax ſyſtem of nerves and fibres, and more weak, watery humours, it only raiſed the powers of the oſcillatory veſſels ſo high, and warmed the blood ſo much, as to carry off the ill conſequences of deficient perſpiration, and ropy heavy juices, by repeated fits of a regular intermittent. Thus we often ſee perſons of low ſpirits, and a leucophlegmatic habit of body, raiſed into a ſeveriſh diſpoſition by the uſe of warm invigorating medicines, chalybeates, &c. And if this turn of nature be well managed, it generally ends in their perfect recovery. If you can change a ſlow nervous fever into a regular intermittent, you ſoon cure your patient.

But farther, I have more than once known pleuriſies, peripneumonies, and inflammatory rheumatiſms, reign very much in a cold, dry ſpring, and a great number of intermittents ſucceed them in the following warmer months; the heat abating the rigidity of the fibres, and reſolving, in ſome meaſure, the viſcoſity and denſity of the blood; whereas had the ſolids continued more tenſe, and the blood more denſe and viſcid, inflammatory fevers would have been the conſequence on taking cold, or the like, which now only produced an aguiſh diſorder.

Regular vernal intermittents have many times ſalutary effects, by breaking the lentor and morbid coheſions of the blood; as a ſtorm purges a thick foggy atmoſphere. The invigorating power of the advancing ſpring, and the encreaſing genial warmth and dryneſs of the air, by rarefying and attenuating the heavy, fizy humours, and opening the pores, are the reaſons why vernal agues go ſo eaſily off at the approach of ſummer. And probably the enlivening, attenuating influences of the growing ſpring, actuating the powers of nature to throw off the heavy, ropy *colluvies*, that in ſome may be conſiderably amaſſed during a cold moiſt winter, may be one reaſon, at leaſt, of the frequency of agues in the ſpring ſeaſon. It is certain all nature, at that time of the year, undergoes a kind of orgaſm; even the torpid vegetables regain freſh life, and their concreted juices reſume new motion.

It appears from experiments, * that the blood in quotidians is more denſe and tenacious than in tertians, in tertians than in quartans; ſo that in quotidians, *cæteris paribus;* it comes neareſt an inflammatory ſtate: and it is commonly noted, that if the fever, from a regular tertian, runs into a ſemitertian, or quotidian, or greatly anticipates the time of the regular paroxyſm; a remittent, or continual fever, is forthwith the conſequence; and this is too often effected by a very hot regimen, or a too haſty uſe of the bark. Indeed we very frequently ſee that quotidians, and double tertians (which, by the bye, are oftentimes the ſame thing) will not bear the bark at the beginning; till the ſaline draughts, proper diluting attenuants, and, in ſome caſes, bleeding, purging, and vomiting, have been made uſe of. In truth, I never think it prudent, in ſuch kind of intermittents, to give the bark, in any form, till after four or five paroxyſms at leaſt, and after having drawn more or leſs blood from perſons pretty much inclined to the plethoric; and this method is more eſpecially to be obſerved in vernal agues. I muſt farther note, that as nothing is more effectual in curing agues than well-timed vomits, and thoſe too repeated (as nature ſhews us, by making this one of her conſtant efforts in the paroxyſm) ſo previous bleeding makes them much more ſafe in full ſanguine habits, eſpecially when given in the paroxyſm, which is frequently practiſed with great ſucceſs. Nor is this a new practice, for Celſus adviſes, *cum primum aliquis inhor-*

* See Dr. Langriſh's Modern Theory, &c. Chap. V.

ruit,

ruit, & ex horrore incaluit, dare ei oportet potui tepidam aquam subsalsam, & vomere eum cogere. Lib. iii. Cap. 12.

We see, then, that some kinds of agues border too near on the inflammatory state, and require a cool regimen, proper dilution, and many times bleeding to some degree, as well as other evacuations. I have known it necessary to join nitre to the bark during the whole process of cure, and even sometimes to suspend its use for a day or two, and give salt of wormwood and juice of lemons, with infusion of chamomile-flowers and sevil-orange rind, or the like.—If an intermittent runs into an inflammatory continual fever, bleeding and a gentle cool purge, will soon reduce it to its type.

But as some intermittents are apt to run up into an inflammatory fever, far the greater number, especially in the autumnal season, are disposed to sink into low irregular remittents, putrid or slow nervous fevers. It is not a very rare thing to find a quotidian fall into a tertian, thence into a quartan, and at last end in a dropsy; and this particularly in some seasons and places. This evidently shews that the fibres grow more and more enervate, and the blood very vapid and watery. Even vernal tertians, which oftentimes cure themselves in a favourable season, prove many times exceeding obstinate in wet rainy summers, and the patients are exceeding apt to relapse on the slightest occasions: this was particularly observable in the wet cold summers of 1734 and 1735.* In such cases I have known the daily use of the flesh-brush, and frequent cold bathing, of very great use in preventing relapses. Perhaps it is the winter-cold, bracing up the fibres, that commonly puts a stop to agues in that season; for it hath been noted, that they are often very stubborn in a warm moist winter.

* Vid. Obs. nostr. de Aere & Morbis Epidemic. Vol. I.

Improper evacuations by bleeding and purging, an unwholesome, gross, glutinous diet, vapid ropy drinks, as stagnant heavy water, foul beer, and the like, render these agues very anomalous, obstinate, and dangerous, and make them frequently degenerate into malignant, putrid, or slow nervous fevers; otherwise they end in dropsies, jaundice, or universal obstructions of the viscera of the abdomen, and frequently in diseases of the *genus nervosum*.—In a word, whatever takes down the spring of the fibres too much, and weakens the crasis of the blood, will be productive of these mischiefs; and this especially, when due perspiration is frequently interrupted by cold damp air, want of due exercise, gross heavy slimy diet, as fish, lettuce, cucumbers, and other watery insipid fruits, which are known to suppress the perspiration greatly.

These observations then, evidently shew the necessity of using a warm, invigorating, attenuating regimen in the cure of agues, which affect persons of a lax habit of body, and a poor thin blood; in a particular manner when a wet foggy atmosphere prevails. Under such circumstances, the cortex of Peru, however good and carefully chosen, frequently proves ineffectual, unless assisted with proper alexipharmics, as rad. serpentar. Virgin.—Contrayerv. myrrh, camphor, &c.—After four or five paroxysms, warm chalybeates may be added with very great success. But never be too hasty in giving the bark, or chalybeates, where the patient hath a yellow cast of the countenance, a tense abdomen, and a very costive habi of body.—In which case, mercurial saponaceous deobstruents with rhubarb, aloetics, regenerate or soluble tartar, should be premised; nay, they may in some cases be very conveniently joined with the bark.

From the whole then of what has been said on this head, it appears that a regular tertian is a medium between an inflammatory and a slow nervous

fever; and that, on the one hand, the conſtitution of the ſolids and fluids may be ſo highly wrought up as to fire the blood into a continual inflammatory; and that, on the other, it may be ſo far depreſſed as to bring on the low influent, or ſlow nervous fever.—And hence the cauſe and cure of ſuch fevers reſpectively ſeem to be obvious.

Now as every kind of fever is a ſtruggle of nature to relieve herſelf from ſomething oppreſſive, we ſhould always favour her endeavours by the moſt proper means that reaſon and experience ſuggeſt. But we ſhould be very cautious, at the beginning eſpecially, how we proceed in ſpurring on, or bridling her efforts, till we have well conſidered the nature, quantity, and quality of the diſeaſe, and conſtitution of the patient. In order to this, it will be highly neceſſary to make a diligent examination into theſe two things; 1ſt, the ſtate of the ſolids; and 2dly, that of the fluids.

CHAP. III.

Of the State of the Solids.

PROBABLY all that we call firmneſs of body, and ſtrength of conſtitution, is originally owing to the *rudimental ſtamina* of our bodies; and on the ſtrong or weak texture of them, in a great meaſure, depends our future proſperous, or adverſe health. There was, indeed, a determined conſtitution and ſtrength of fibres deſigned by nature, and any deviation from it may be called a diſeaſe, which may ariſe from weakly parents, errors in diet, exerciſe, and many other things: and this deviation I would have heedfully attended to in practice.

A due proportion of tenſity, conſiſtent with a proper degree of flexibility, conſtitutes the happy medium in which perfect health conſiſts. Too great a degree of rapidity tends to waſte the nutricious juices too ſuddenly, and ends in a *maraſmus*; as too great a laxity of the veſſels makes them liable to be overloaded, and brings on a *leucophlegmatia*, or dropſy. The former over-digeſts the animal fluids, the latter doth not ſufficiently aſſimilate what is taken in by way of nutriment.

A very ſtrong elaſtic ſet of veſſels act with great force on the contained fluids, and produce much friction, and of courſe great heat, and withal a conſtant and large diſſipation of the more ſubtile and aqueous parts, which render the blood-globules, in proportion, more numerous, more denſe and compact, and the humours in general more viſcid, as is evident by the ſtate of the blood always obſervable in ſtrong laborious people, which is ever of this kind. Where this conſiderably overbears the ſtandard of nature, it becomes conſtitutional diſeaſe, and cauſes a perpetual fever, as it were, and at long-run, ends in atrophy, and a complete maraſmus, if ſome violent inflammatory diſeaſe doth not ſnap them off much ſooner; and to which they are exceedingly liable, and from which, on account of the denſe viſcous ſtate of the blood, the rigidity and contraction, or ſtricture of the veſſels, they eſcape with much greater difficulty than others of ſofter fibres, and a more weak, but fluxile blood. There is no advantage without an allay; the roſe hath its prickles; theſe diſadvantages flow even from the higheſt health and vigour—human frailty!

In ſuch conſtitutions, the uſe of emollient farinaceous drinks and diet is highly proper, and frequent ſubtepid bathing, eſpecially in very dry and very cold weather. Where perſons of ſuch a frame fall into inflammatory fevers, as pleuriſies, peripneumonies, or the like, I would always adviſe great plenty of tepid, watery, emollient diluents to be perpetually ſipped; by which means the warm vapor relaxes the parts and

paſſages

passages of the lungs, and promotes a freer flow to the blood through them, and a more easy and copious expectoration; at the same time that the blood is thus most effectually diluted. Withal, fomentations, emollient and diluting, moderately warm (not too hot) should be applied to the feet, legs, hands, arms, hypochondria and breasts; which have oftentimes a surprising good effect, and are of infinitely greater advantage and efficacy than some of the indigestible trash of the shops, upon which so much stress was formerly laid.

I have known the preposterous use of the cold bath, on a strigose and a too rigid habit of body, of exceeding great detriment; for that even yet augments the corrugation and tensity. You may generally observe, that most who use the cold bath grow somewhat thinner, though more vigorous and active.—Some years since I was consulted by a gentleman of a thin scraggy habit of body, but of much natural vivacity of spirit, and one that constantly used much exercise, and had long accustomed himself to cold-bathing in the sea very frequently, even sometimes in very cold weather; he wasted daily in his flesh, and at length became weak, and very low-spirited. I judged that by this method the fibrous system was over-braced, and that too much of the finer lymph, and even of the *liquidum nervosum*, was forced off by the pores, &c. For he all this while used a sufficient quantity of food, and had no extraordinary sensible evacuation.—I put him on a soft, relaxing, nourishing diet, forbad him the use of the cold-bath, and at last sent him to use the waters at Bath. The event was, that he soon recovered much better health, spirits, and flesh. Nothing, on the contrary, more effectually strengthens weak, lax fibres, than cold bathing. By this, weak, flabby, rickety children are soon invigorated, as it were, to a miracle. Indeed, in the times of Popery and ignorance, when the priests were knaves, and the people fools, many a well was sanctified for nothing but pure cold water, the virtues of which, the miracle-mongers wholly attributed to a saint of their own making.

The doctrine of the ancient Methodists, with respect to the *strictum* and *laxum*, if rationally pursued, might be of great service in the practice of physic; though they indeed frequently confounded them both in theory and practice. But Boerhaave hath made many rational and valuable observations on the diseases of too tense, and too lax fibres, which are of exceeding great use in practice. There seems to be another species of fibres, not taken notice of, which may be called the tender, or delicate constitution of the solids, which is most readily and highly affected with pleasure or pain; but in which the *stamina* are so slender, that a very slight accident breaks them. This is often observed in thin, fair persons, of a very delicate frame, but exceedingly lively; in whom the spirit is willing, though the flesh is weak. Such very often fall into an *hæmoptoe*, or other *hæmorrhages*, colliquations, and a pulmonary *phthisis*, and thence become what is peculiarly called consumptive.

We have taken a short view of the ill effects of a too great stricture, or tension of the solids; let us next cursorily see what disadvantages arise from their too great laxity.

Weak vessels do not sufficiently act on the contained fluids, they do not sufficiently comminute, round off, and assimilate the chyolus particles. Indeed the chyle itself, where the organs of digestion are weak, is never well prepared. Where the vessels have a due tone, and act with vigor on the nutritious juices which they receive from the stomach, &c. no chylous irregularly-formed particles are to be found in the blood after a few hours from the repast; but in weakly leucophlegmatic people, they

are never, or not till a very long time, reduced into blood-globules, and a proper serum. Besides, in these lax habits, the blood itself is not sufficiently actuated, and driven on with force enough to keep a due vital warmth, nor to work up the salts and sulphurs, or oils, to such a just degree of tenuity, as may fit them to serve the purposes of animal nature; nor are the red globules of the blood (the great principle of life and heat) duly compacted, and moulded into a sufficient roundness and firmness. Hence irregular concretions in the vessels, a lentor, a ropiness in the serum and lymph, few animal spirits, and all the secretions weak and imperfect. From the whole follow cachexy, leucophlegmatic and dropsical disorders, irregular intermittent and remittent fevers, or those of the slow nervous kind, the humours running into a kind of putrescence for want of due motion and a circulation, and stagnating in the *ultima vascula*, on account of the obstructions continually forming from the want of a due action of the vessels, which do not sufficiently agitate, comminute, and protrude, their contents.

Now all humours of the body that stagnate, soon begin to corrupt and grow acrimonious, and that too many times to such a degree as to bring on fevers of the worst kind; for though the circulation may be very languid, from the weakness of the contracting propelling vessels, yet it is sufficient to cause some degree of feverish heat from the stimulating acrimony, and at last a general putrefaction; witness the chlorotic fevers, which very often prove of exceeding dangerous consequence. Cold hydropic tumors of the legs, frequently end in a kind of erysipelas and gangrene.

A due consideration, therefore, of the state of the solids, is a matter of high importance to physicians, not only in chronic, but also in acute diseases; for they are generally the primary efficient causes of the particular states of the fluids. For instance, we may naturally conclude that a man of a robust constitution, strong, rigid fibres, and used to much exercise, hath a dense rich blood, inclining to such a degree of viscidity, as will bring on inflammations on the accession of a feverish disorder; and of course, that timely bleeding is the proper way to prevent it. On the contrary, that a weak, lax, flabby constitution, hath a poor, thin, watery blood, and cannot bear bleeding well, nor large evacuations.

A diligent enquiry of this nature is of vast concern in the beginning of acute diseases, particularly in the small-pox, and other eruptive fevers, so as to determine one to bleed, or not to bleed.

For instance, where a strong man, with a strong pulse, is seized with violent symptoms of the small-pox, it would be unpardonable not to bleed before the eruption; for we cannot but suppose the inflammatory fever must run high in such a constitution; but it would be great rashness to bleed persons of a weak, lax habit, unless some very urgent symptom demanded it.—Yet how little is this regarded in the vulgar practice! For some bleed and vomit, of course, upon the least appearance of an attack of the small-pox; whereas others are so fearful of weakening their patients, that they suffer them to die of the inflammation, even abstracted from the virulence of the disease.

If any physician hath a previous knowledge of the patient, he can be at no great loss in judging of his constitution; and therefore Celsus rightly pronounces, *cum par scientia sit, utiliorem tamen medicum esse amicum quam extraneum.* * When that is not the case, hard firm flesh, dry skin, great heat, thirst, and colour, hot breath, and violent pains, with a strong, tense, quick pulse, are pretty evident symptoms of strong, very elastic fibres, and of an ardent or in-

* Præfat. sub. finem.

flammatory

flammatory fever. A weak, quick, ſoft pulſe, no great heat or colour, little thirſt, pale urine, a ſoft fleſh and ſkin, clammy, partial, irregular, cold, or profuſe ſweats, with heavineſs and anxiety, rather than ſevere pains, and a moiſt, though perhaps a white-coated, or foul tongue, denote the contrary. But in truth, theſe things are rather to be learned from experience, than taught by precept; therefore I ſhall ſay no more on this head.

CHAP. IV.

Of the State of the Fluids.

THE ſtate of the fluids ſhould next be conſidered, which, in a great meaſure, depends, as we ſaid before, on the condition of the ſolids.

There is then, 1ſt, a ſtate of the blood in which the humors are too denſe and viſcous, in which the blood-globules are in too great quantity, and too cloſely compacted or condenſed, in which the ſerous globules are ſo likewiſe; in a word, in which the whole maſs of the fluids is too glutinous, and too apt to concrete into a ſolid form.—Perſons of vigorous conſtitutions, of ſtrong fibres, that uſe much exercise, and a full diet, are peculiarly ſubject to this ſtate.—Now when the blood-globules are very denſe, and in great quantity, and the veſſels very ſtrong and elaſtic, a great momentum of motion muſt be produced in the circulating fluids, and of courſe great friction, and much heat, which both diſſipates the more fluid parts of the blood, and encreaſes its viſcoſity; ſo that the reſidue becomes very glutinous, and leſs fit to paſs the extreme branches of the capillary arteries; and hence obſtructions, hence inflammations.

Beſides, great heat tends to coagulate the ſerum; a heat, not much above the common heat in an ardent fever, will turn the ſerum of the blood into a jelly, as is found by experience. Hence, when blood is drawn off in high inflammatory fevers, it appears covered over with a thick glutinous coat, or buff, as it is called. I have ſeen it in ſome ſevere pleuritic and rheumatic diſorders near an inch thick. That it is thus formed by the febrile heat, is manifeſt; for at the firſt bleeding, at the very beginning of the fever, it ſhall often appear pretty florid, though very denſe; whereas on the ſecond, third, or fourth bleeding, when the heat hath had a long continuance, and been encreaſed to a greater degree, it becomes exceeding ſizy, and covered over with a very thick buff: and indeed, in general, the ſtronger the fever, and the perſon from whom it is drawn, ſo much the more thick and tenacious. And this in a particular manner happens in fevers attended with violent pain, as pleuriſies, rheumatiſms, &c. For the pain being a ſtimulus, which greatly encreaſes the motion, friction, and heat, it incraſſates the ſerum in proportion to its vehemence. And the inflammatory ſize alſo ſticking in the extremely ſmall veſſels of the membranes, &c. over-diſtends them, and produces farther inflammations and pains; ſo that they mutually encreaſe one the other. Though this denſe ſtate of blood, in health, is attended with great bodily ſtrength, a ſtrong firm pulſe, and much natural heat, yet, on the acceſs of a fever, it produces very violent ſymptoms, quickly fatal, unleſs prevented by timely bleeding, cooling, diluting, emollient drinks and medicines.

But farther, an over-fulneſs of even good blood, is a degree of diſeaſe, and therefore Hippocrates * pronounces the athletic Ἐυεξία dangerous, and Celſus elegantly ſays from him, that perſons of ſuch a habit *ſuſpecta habere bona ſua debent*. † Such a plethora not only over-diſtends the ſanguineous arteries, but alſo too much

* Aphoriſm 3. Sect. i. † Lib. II. cap. 2.

dilates

the orifices of the ſerous and limphatic arteries; by which, on the ſlightest occaſions, the blood-globules are forced into them, and form obſtructions *errore loci*, as it is called: whence inflammations and ruptures of the veſſels frequently follow, particularly in the brain and lungs.—Here nothing will relieve equal to blood-letting, which (if not too immoderate) is ſo far from weakening, that it ſtrengthens the patient, by reſtoring a due *æquilibrium* between the ſolids and fluids: the keeping up of which, however, is a matter of great nicety in ſome caſes and conſtitutions; though, in general, it admits of a conſiderable latitude, even conſiſtent with health. Some delicate, florid, plethoric people ſuffer immediately from a very ſmall degree of over or under living; and I have known ſome men of this conſtitution, that have had as regular a menſtrual diſcharge, by ſome kind of hæmorrhage, as the more delicate ſex.—The beſt bred and moſt accurately fed cock, will not hold his athletic ſtate above twenty-four hours,* and dwindles from it ſurpriſingly ſoon—*Quia non ultra progredi poteſt, retro, quaſi ruinâ quâdam, revolvitur*, as Celſus † ſays of a plethoric man.

There is, 2dly, a conſtitution or craſis of the blood, quite oppoſite to the former, in which there are too few blood-globules, and thoſe too looſely compacted; and in which the ſerum is too watery and vapid, and ſometimes of a ropy ſlimy nature. From this weak pituitous blood all the ſecretions are imperfect, and not ſufficiently participant of an animal nature; the bile inert, the animal ſpirits flat and deficient, the ſaliva a mere inſipid mucus, and ſo on.—Hence univerſal indigeſtion, weakneſs, coldneſs, paleneſs, cacochymy, dropſy, &c. In a word, ſuch a ſlow motion of the humours, that at length, for want of a due circulation, they run into morbid concretions, obſtructing the veſſels in ſome places, and ſtagnating in others, where they fall into ſpontaneous corruption, productive at laſt of ſuch a degree of acrimony, as to end frequently in fevers of a very malign nature, and dangerous conſequence: and this the more ſo, as the veſſels, in ſuch a miſerable conſtitution, have greatly loſt their elaſticity, and the blood its moſt vital principles: ſo that, in the event, either the ſlimy lentor ſtagnates up the heart, or the corrupted humours corrode and deſtroy the moſt delicate and eſſential parts of the animal fabric, particularly the compages of the brain, where the humours naturally move exceeding ſlow, and the veſſels are of the moſt tender ſtructure. Thus as too rapid a circulation often burſts the minute veſſels, ſo the humours moving too ſlowly, ſtagnate, corrupt, and at length corrode them.

Theſe two different ſtates of the fluids may not improperly be called conſtitutional, as they naturally follow the reſpective ſtate of the ſolids; ſo as that a ſtrong rich blood always attends a ſtrong elaſtic ſet of veſſels, and a weak watery blood a relaxed habit of body: where either conſiderably deviates from the ſtandard of nature, it becomes a real diſorder, and is to be duly regarded in whatever concurring diſeaſe happens.*

* Lib. II. Cap. 2.

† See Dr. Bryan Robinſon on the food and diſcharges of human bodies, p. 889.

* Ardent and inflammatory fevers are naturally the effect of over-elaſtic and rigid fibres, and a very denſe viſcid blood; as the low and ſlow nervous kinds are of a too lax ſtate of veſſels, and a weak and thin blood. But there are ſeveral diſeaſes, eſpecially thoſe ariſing from contagion, which are common to both.

CHAP. V.

Of the diſſolved and putrid State of the Blood.

BUT, beſides theſe, there is moreover a third ſtate of the blood, of more dangerous conſequence than either; I mean a ſtate of it, that more

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immediately tends to diſſolution and putrefaction: this is evidently the caſe in ſome ſcorbuties, as they are called, where, without any conſiderable, antecedent, ſenſible diſorder (more than perhaps a kind of laſſitude and langour) perſons have, on a ſudden, an eruption of violet-coloured, livid, or even black and blue ſpots all over their body, and forthwith fall into profuſe, and ſometimes dangerous, and even fatal hæmorrhages, when they have ſcarce thought themſelves, or been thought by others, to be under any manner of diſorder. Abundance of inſtances of this kind happen: I have ſeen a great many, both in children and grown perſons, and frequently foretold the enſuing hæmorrhage.

Where women have ſuch eruptions, or black or blue vibices, or large irregular ſpots like bruiſes, they are always ſubject to a vaſt overflow of the catamenia, if not to other profuſe hæmorrhages. Nay, when perſons of either ſex are affected with theſe appearances, they are apt to bleed exceſſively from the ſlighteſt wound, and very often without any, from the gums, noſe, guts, or urinary paſſages.

The blood of ſuch perſons, when it hath been drawn off, in order to prevent the farther progreſs of the hæmorrhage, as was imagined (which, by the way, is very improper, unleſs there are very manifeſt ſigns of a plethora) always appears a mere gore, as it were, not ſeparating into craſſamentum and ſerum, as uſual, but remaining in an uniform, half-coagulated maſs, generally of a livid, or darker colour than uſual, though ſometimes it continues long very florid; but it always putrifies very ſoon. It is even obſervable, that the breath of ſuch people moſt commonly ſtinks much before the eruption, and their urine frequently ſmells very rank; evident ſigns of the beginning putridity of the humours; which, growing more and more acrimonious, at length erode the veſſels. For theſe kinds of hæmorrhages often happen to perſons that have not the leaſt ſign of a plethora, no full, no very quick pulſe, little or nothing of a feveriſh habit, nor under the uſe of violent exercise; ſo that they happen from the corroſion, not the rupture, of the veſſels broke open by too great a quantity and velocity of the blood. In ſome very tender and delicate conſtitutions indeed, a very ſmall effort will ſometimes burſt their fine thin veſſels, as is obſervable in ſome, who are ſubject to an hæmoptoe, or bleeding at the noſe from every ſmall accident; but theſe hæmorrhages are ſeldom attended, or preceded, with livid, or violet-coloured eruptions, &c. In theſe caſes, drawing of ſmall quantities of blood is proper, to abate the too great impetus on the tender veſſels, even though there may be no apparent plethora.

Though, I am perſuaded, the above-mentioned hæmorrhages moſt commonly ariſe from an acrimonious ſtate of the humuors, which breaks the craſis of the blood, and corrodes the extremities of the capillary arteries; yet they ſometimes alſo happen from a too looſe contexture of the blood-globules, not ſufficiently compacted by the action of the heart, arteries, &c. for want of which they become oblate ſpheroids, or irregularly formed moleculæ, inſtead of regular ſpheres, and of courſe of a greater diameter, and a leſs firm compages than natural. But it appears from microſcopical obſervations (eſpecially thoſe made with the ſolar microſcope) that the blood-globules, in paſſing through the minuteſt ramifications of the ſanguineous arteries, change their globular, into a very oblong figure frequently, in order to paſs through theſe exceeding ſmall veſſels. And it is eaſy to conceive how theſe looſely-cohering globules may be broken in their paſſage, as the enlarged bulk makes their tranſit more difficult. Now as theſe broken parts are of much leſſer diameter than the original globules, they may readily enter, and even paſs through ſome of the excretory ducts, and tranſude *per diapedeſin*, as the

ancients

ancients called it. That this is so in fact, seems to appear from the bloody urine, stools, and other hæmorrhages, which sometimes happen without any manner of pain, violence of motion, or the least suspicion of the rupture of any vessels. Nay, I have more than once or twice seen in malignant fevers, and that too where the motion of the blood was far from being very rapid, a kind of * bloody sweat from the axillæ, tinging the linen almost of a Burgundy-wine colour. And it is observable, that when this sort of hæmorrhages happens from the nose, the matter is a thin bloody ichor, not concreting, as blood commonly doth from the nose of persons in health, or in an inflammatory fever, which is generally very thick, shining and florid. Some chlorotic girls are vastly apt to bleed from the nose, and yet their blood doth but just colour a linen cloth. The petechiæ, vibices, or livid stigmata, that very often attend these hæmorrhages, shew that the blood-globules are dissolved, or broken down, and enter into the serous arteries, *vasa exhalantia, &c.* where sticking fast they form these appearances. And I have particularly noted, in some putrid, malignant fevers, a kind of yellow, or rather dun petechiæ,† vastly numerous, and of not less fatal omen than the others. Here the blood-globules were broken into such small particles, as to have quite lost their original colour when combined. Perhaps the fuliginous sweats, and dark coloured, or black urine, with a livid sediment, which sometimes happen in fevers of the malignant kind, arise from a broken corrupted state of the blood-globules. I have seen several times the urine rendered almost quite black, depositing an immense quantity of matter nearly of the colour of coffee-grounds. And we are sometimes surprised to see the face and hands of the sick grow dirty, and sooty, as it were, though all imaginable care was taken to keep them clean.

Besides, there are some things that seem to destroy the copula of the blood-globules, and greatly promote the secession of the six serous globules that compose them, one from another; particularly laurel-water, which makes the *crassamentum* vastly less dense, and exceedingly more soft and tender than natural, and turns the serum red, or the colour of Burgundy-wine, as appears from the experiments * of Dr. Nicholls and Dr. Langrish.† The bite of the serpent hæmorrhous ‖ causes such a dissolution of the blood, that it breaks forth from all parts of the body, even the very pores, and kills by an universal hæmorrhage. Possibly profuse sweats, diarrhœa, diabates, and spontaneous salivations, may arise from a kind of dissolution of the serous globules. A long and large use of mercury will turn the whole mass of blood into a mere watery colluvies.

But, as I said before, this broken, corrupted state of the blood-globules is, in general, the effect of acrimony. ‡ *Sal volatile oleosum* mixed with blood fresh drawn, destroys or dissolves the globules in less than a minute;** spirits of hartshorn, taken in large quantities, will produce hæmorrhages; and so will frequent and large doses of aloetics, as I have again and again observed. Indeed, such a state of blood is commonly brought on by acrimonious diet, medicines, &c. Thus the salt and half rotten provisions of sailors, in long voyages, cause such a sharpness and corruption of the humours, that they are rendered almost unfit for the com-

* Dr. Hodges, of the plague, observed purple sweats in it, and some like blood.

† Vid. Obs. nostr. de Aere & Morb. Epidem. vol. I. ann. 1735. Mart. & Aprili; & vol. II. Anno 1740, Junio.

* Dr. Mead of Poisons, 3d Edit. p. 270.

† See his Experiments on Brutes.

‡ See Lucan, Dioscorid. Nicander in Theriacis, &c. Dr. Mead of Poisons.

‖ See Leeuwenhoek. Epist. ad. Christoph. Wren. Arcan. Natur.

** Arbuthnot of Diet, p. 106.

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mon uses of life, producing great weakness, languors, wandering pains and aches, stinking breath, corroded spongy gums, black, blue, and sallow spots, sordid, dark, livid, fungous ulcers, gangrenes, &c. and such scorbutics frequently fall into petechial fevers, bloody dysenteries, hæmorrhages, &c. What is mentioned by the Rev. Mr. Walter, in Lord Anson's voyage, is very surprising, viz. that the blood burst forth from the wounds of some of the scorbutics, after they had been cicatrised for twenty or thirty years. I have known many a ship's company set out on a cruise in high health, and yet in two or three months return vastly sickly, and eaten out with the scurvy, a third part of them being half rotten, and utterly unfit for service. About four or five weeks after they have been out, they begin to drop down one after another, and at length by dozens, till at last, scarce half the compliment can stand to their duty. Particularly I remember, some years since, from a squadron under Admiral Martin, we had near 1200 men put on shore sick at one time, though they went out very healthy, and returned in about twelve or thirteen weeks.*

Those who accustom themselves to take largely of volatile and fixed alcalious salts, species, and aloetics, are always subject to these maladies:—Not a few of those, who took the *alcalious saponaceous hotch-potch of* Mrs. Stephens, and the soap lees, for a long time together, fell into hectical heats, a hot scurvy, hæmorrhages, dysentery, &c. A remarkable instance of this lately happened to a gentleman of the West of Cornwall, who, for several years had laboured under a stone in his bladder.

He was originally of a very tender constitution, and had taken the lixivium, &c. for several weeks, till at length his gums began to grow exceeding spongy, inflamed, and livid, at last extremely sore and putrid, insomuch that the flesh might be pulled off with the greatest ease; they bled considerably on the least pressure; and a thin bloody ichor continually leaked off from them. Livid spots also appeared on him, and his legs, and thighs especially, became vastly sore, and of a claret colour, or rather more livid, so that a mortification was feared. Upon this, I was consulted for him, by Mr. Hingston, a very skilful apothecary of Penryn, who stated his case. Apprehending an alcalescent putrid state of the humours, and a dissolution of the blood from the course he had gone through, and the symptoms he now laboured under, I advised the decoction and extract of the bark with elixir vitrioli, and sub-acid drinks and diet; which soon took off the inflammation, sponginess, and bleeding of his gums, and prevented the farther advance of the livid colour of his thighs, &c. which in a few days disappeared. About some two or three weeks after, a copious eruption of red fiery pustules broke out upon him, which seemed to promise some advantage. However, being reduced exceeding weak by a complication of disorders, and a confirmed hectic, he died quite tabid, about a fortnight or three weeks after. A very large stone was taken out of his bladder after his death, of the shape of a pear, weighing eight ounces and half a drachm avoirdupois; the smaller end lay towards the neck of the bladder.

It unquestionably appears from experiments made on the urine of those that have taken pretty largely of the lixivium, or Mrs. Stephens's medicines, that the urine becomes alcalious,

* Upon this, I drew up a proposal for preventing the scurvy among the sailors, which I communicated to several captains and surgeons of the men of war. This I afterwards published in the General Evening Post in October 1747, which was re-published in the Gentleman's Magazine, &c. for October 1747. As it hath since been tried with success, both in the men of war and privateers, and, as I am fully convinced of its usefulness, I again recommend it.

ſious,* and of courſe the ſerum of the blood likewiſe, from whence it was ſecreted. This is indeed a very ſtrong argument in favour of the lithontriptic or diſſolvent power of the medicines; as they have undoubtedly this effect on human calculi, when macerated in them out of the body. But I think, at the ſame time, it gives us juſt reaſon to ſuſpect very dangerous conſequences from a long uſe of ſuch things, eſpecially in ſome tender conſtitutions.

It is well known, that volatile alcali ſalts, mixed with the blood when juſt drawn, or rather as it runs from the vein, keep it from coagulating, and hinder it from ſeparating into craſſamentum and ſerum, as uſual. The experiment is eaſy, and every one will find it true on trial. This very adequately reſembles the blood drawn from the bleeding ſcorbutics, and alſo from moſt perſons that labour under putrid petechial fevers, when the blood is drawn very early in the diſeaſe.

All humours of the body, actually putrefied, become a ſtrong alcali, and putrid blood loſes its conſiſtence, and ſoon after its colour, running into a yellowiſh dark-coloured ſanies. The blood drawn in ſome greatly-putrid petechial fevers hath had this appearance, and been obſerved actually to ſtink as ſoon as drawn, † as well as the urine as ſoon as made; ſo far was the putrefaction advanced, whilſt even life was ſtill ſubſiſting. The ſurpriſingly great and ſpeedy corruption of bodies, dying of peſtilential fevers with ſpots, ſhews this likewiſe. I have known ſuch a corpſe *air* ‖ as much, as they call it, in ſeven or eight hours, as dead bodies commonly do in ſeven or eight days, and to leak out a moſt putrid ſanies from all the outlets of the body; which, by the bye, is a reaſon why perſons, dying of ſuch fevers, ſhould be buried very ſoon.

Some kinds of poiſons, as particularly the bite of a viper, and ſome other venomous animals, bring on a very ſudden corruption and diſſolution of the blood, and turn it into a yellowiſh ſanies. Peſtilential effluvia alſo ſoon deſtroy the craſis of the blood, and produce an univerſal gangrenous diſpoſition in the humours. This is evident, from the frequent and fatal hæmorrhages, exceſſively fœtid ſweats, vomitings, and ſtools, and the general necroſis that follows, which have been obſerved in the plague and peſtilential fevers by the beſt authors.* The hæmorrhages, in particular, are often vaſtly profuſe and obſtinate in the plague; and I have many times noted the ſame in peſtilential and petechial fevers; and the blood, thus iſſuing, doth not coagulate † as uſual. All arguments of the higheſt acrimony and diſſolution of the blood.

The contagion of the ſmall-pox ſeems to effect ſome conſtitutions much in the ſame manner, producing ſpots, putrefaction, and vaſt effuſions of blood from ſeveral parts of the body, ſometimes even at one and the ſame time. I have ſeen many inſtances in this diſeaſe, where, within four or five days from the ſeizure, purples have appeared all over the body, and hæmorrhages from ſeveral parts in a profuſe manner; particularly the uterus, urinary paſſages, and noſe; and the puſtules have turned quite black, a bloody ichor iſſuing from them in abundance; and this too where no violent ſymptoms of any kind had preceded. Little Miſs R—n, about five years old, had ſuch a kind about fourteen years ago; they came out with ſcarce any conſiderable fever, pain, ſickneſs, or the like, yet ſpots appeared at the ſame time very large, livid, and black. The pox were but

* See the Experiments of Dr. Hartley. Rutty. Monſ. Morand, &c. on this matter.

† Vid. Vander Mye de Morbis Bredanis. Morton, Pyretolog. Prolegomen, p. 26.

‖ De Aere & Morb. Epidem. Vol. I. Marano, 1735.

* Particularly Diemerbroek, Hodges, and the authors in Traite de la Peſte fait par ordre du Roy, Paris 1744. 4to.

† Traite de la Peſte, Part I. p. 345.

few

few, some of which, about the lips, internal parts of the cheeks, and tongue, turned very black, and bled pretty largely. The child was often taken with a slight deliquium, and forthwith would return to her playthings as before. At length she brought off pretty much florid blood, and some black and coagulated, by stools, and sunk away insensibly, as it were, into the arms of death, about the ninth day from the attack of the disease.

I lately saw a dreadful case of this kind in Miss B—y, a young gentlewoman, who had much fatigued herself in very hot weather (immediately before the seizure with the small-pox) by walking, riding, dancing, &c. She had millions of truly-small pox, and a vast number of black and blue spots, that broke out all over her body the third day inclusive from the seizure, and her legs and thighs appeared quite purple; she bled at the gums and nose very largely, and yet at the same time had a very profuse discharge of the catamenia about six days before the regular period. She died the sixth day from the attack. She had from first to last an inexpressible load at her breast, with vast anxiety, frequent faintings, and a vastly quick, fluttering, small pulse.

It is always a fatal prognostic when spots and hæmorrhages appear at the very eruption of the small-pox, and the sick seldom or never survive the ninth day of the disease; the blood running into immediate dissolution and putrefaction. I am persuaded, scarce one in a thousand recovers under these dreadful circumstances; especially if the spots are very livid, black, and numerous. If any thing is to be done in these deplorable cases, it must be by timely and duly administering acids, the bark, and astringent alexipharmics; which certainly have oftentimes exceeding good effects in petechial fevers attended with hæmorrhages. Dr. Mead, in his late elegant Treatise De Variolis & Morbillis,† hath given us reason to hope for success by the use of these medicines, in the bleeding and petechial small-pox, and also the method of exhibiting them.

This dissolved state of the blood also often happens in putrid malignant fevers, arising frequently from contagion; but is sometimes the mere effect of a fever seizing persons of an acrimonious state of the blood and humours, which is the case of the highly scorbutic. The former acting in an analogous manner to the poison of the viper on the blood; the latter by the power of the saline spicula on the blood-globules, which is now greatly encreased by the febrile motion and effervescence of the blood. Thus an inflammatory tumour in persons of a good, sweet, sound constitution, suppurates into a kindly laudable matter; in a very sharp state of humours, it turns either into a gangrenous sanies, or cancerous ichor. What the action of animal heat and motion will do, on the salts of the animal humours, may be seen in the case of those that die of famine: for take the soundest person, and deprive him of all liquid and solid aliment, the salts become continually more and more acrimonious; till at length a fever, delirium, &c. are brought on by their great irritation, which soon ends in universal putrefaction and death. You may see how this putrescence of humours advances by taking a healthy nurse, whose milk, for some hours after eating, is white, thin, sweet, and grateful; let her fast for sixteen or eighteen hours, it becomes thick, yellow, salt, and disagreeable: let her farther abstain for some few hours longer, it turns of a much deeper yellow, nauseous, and even stinking; and all this much more so if she happens to labour under a fever, a bloody kind of matter issuing instead of milk.—If this happens to the most ascescent and sweetest humour of the body,

† Cap. iii. De variolarum curationibus.

what think you happens to the bile, lymph, &c.?

Where the heat and attrition of the blood are very considerable, its putrefaction advances surprisingly fast. It appears from * Boerhaave's experiment on a dog, shut up in a hot sugar-baker's stove, that the whole mass of humours was corrupted to so high a degree, in a few minutes, as to give off an insupportable stench; and so dissolved, that the very saliva became bloody; and so horribly offensive, as to throw a strong man, concerned in the experiment, into faintings.

The animal humours naturally run into dissolution and putrefaction, unless prevented and corrected by daily supplies of ascescent aliment; a diet merely of flesh, fish, spices, and water, will very soon bring on a putrid fever. Bread is not only the staff of life, as nourishment, but as it also corrects, by its ascescent quality, the rank juices of animal food. The Spanish and French prisoners here, by eating unusual and immoderate quantities of flesh, brought on such dangerous fevers as carried off vast numbers of them.—They were so fond of it, that they died, as it were, with flesh in their mouths frequently.

But thus much for the generation of alcalescent acrimony in the blood: let me add, that it seems to appear, from what is above said, that, in some cases, the animal salts are rendered actually alcaline, volatile, corrosive, and destructive of the blood-globules, as well as the *minima vascula*, while even life subsists. When the animal oils are also highly exalted and rancid, they unite with these salts, and make a most destructive dissolving sapo, much of the nature of putrid bile, which corrodes and dissolves all the principles of life.

Now, as, on the one hand, an acrimonious state of blood may be complicated with too tense rigid fibres, and an inflammatory lentor; so, on the other, it may consist with a thin dissolved state of blood and weak lax fibres.

Let us put contagion for acrimony (for it acts in a like manner, and eventually proves so) and we have the cases very justly exemplified in the small-pox; where the disease is sometimes attended with a very viscid state of blood, high inflammatory fever, violent acute pains, peripneumonic symptoms, phrenzy and the like: sometimes, on the contrary, with a weak dissolved blood, a low slow pulse, or a weak and quick one, nervous symptoms, thin crude urine, various and profuse hæmorrhages, little or no pain, swelling, soreness, or the like. In the former case the fever runs too high, and burns up the patient; in the latter there is not fever enough to make a complete protrusion and maturation of the pustules, but they remain sessile, crude, and undigested; whence at last the whole mass of blood runs into a putrid corrosive ichor, or a gangrenous sanies.

Take another view of this matter. I have many times known pulmonic, or pleuro-peripneumonic fevers attack persons of a very thin acrid state of blood, which have been attended with a very considerable degree of inflammation. This happens very frequently to scorbutic sea-faring persons.

In the years 1740 and 1745, abundance of people were seized with shivering, then great heats, fever, and difficulty of breathing, importunate laborious coughs, very acute darting pains of the breasts, sides, and back; and frequently also in the head and temples. They had oftentimes a very quick hard pulse, but concentrated, as it were; the breath was very hot and offensive, and the matter they expectorated was sometimes thin and crude, and sometimes as yellow as saffron; but much more commonly a thin, gleety, bloody matter, frequently very fœtid, and sometimes so acrid as to cause a great hoarseness, and

* Vide Boerhaavii Chem. Cap. de Igne, Experiment xx. Coroll. 16.

and foreneſs of the wind-pipe and throat, and ſometimes excoriations of thoſe parts.

The blood drawn from them was either of a darkiſh livid colour, covered over with a lead-coloured or greeniſh thin film, or ſometimes quite florid (particularly on the firſt bleeding) but of a looſe ſoft conſiſtence when cold; the ſpecious appearance often ſurpriſing the ſurgeon, or apothecary, who expected quite another appearance of the blood, conſidering the ſymptoms. However, in many of theſe fevers, the blood drawn was covered over with a pretty thick tough coat, not of a whitiſh yellow colour, as uſual in common pleuritic or pleuro-peripneumonic blood, but of a colour approaching to that of a cornelian ſtone, or a little more dilute than that of the common jelly of red currants. This colour of the buff on blood, I conſtantly obſerve to be of ill omen. I conjecture becauſe it indicates both a great glutinoſity, and alſo a very great quantity of acrid ſalts, in the blood, which break its globules, and put it into a putrid diſſolving ſtate; for this appearance ſeems to ariſe from the broken globules inviſcated by the inflammatory ſize. If a portion of volatile-alcali ſalt be mixed with the blood of a perſon in a high pleuriſy, as it runs off from the vein, the upper part of the craſſamentum will greatly reſemble that of the blood, which I have juſt mentioned. And it is farther remarkable, that the ſerum of ſuch kind of blood hath very often a bloody tinge, almoſt as high as Burgundy-wine; and ſo indeed frequently had the ſerum of the other kinds of blood, though many times it appeared only of a turbid yellow colour. The urine was commonly very high, and ſometimes dark-coloured, with a kind of lead-coloured ſediment; it was generally rendered in ſmall quantities. Faint, uncertain, partial ſweats, often attended, particularly about the face and head; although many times, towards the fatal period, they were very profuſe and colliquative. Livid, or black ſpots, frequently appeared about the ſtate of the diſeaſe, and I think ſeldom or never failed of being the certain harbingers of death. The black and brown thruſh, which alſo ſometimes broke out towards the cloſe, were not of a much more favourable prognoſtic. But an univerſal, burning, itching raſh, ſometimes terminated the fever; and ſometimes it ended in an eruption of very large, angry, ulcerating puſtules on the neck, ſhoulders, and arms, but more eſpecially about the noſe and lips.

But of this kind of peripneumonic fever more hereafter, with the method of treating it. I ſhall only at preſent take notice, that at the ſame time when this malignant peripneumony, if I may ſo call it, reigned in Plymouth and its neighbourhood, pleuriſies, peripneumonies, and pleuro-peripneumonies, were every where epidemic, and generally of the true inflammatory kind, ariſing from the cold dry northerly and eaſterly winds, which had for a long time prevailed. In theſe the blood was very denſe and ſizy, and moſt commonly covered over with a very thick, white, or yellowiſh buff; and the ſick bore the loſs of blood well and to advantage, even to forty ounces, or upwards ſometimes. Whereas the blood, in the malignant pulmonic fever, was as I have above deſcribed it; and when it was conſiderably buffy, it had the above-mentioned appearance, and the patients often ſunk ſurpriſingly after the firſt or ſecond bleeding; ſometimes, indeed, to my great concern and aſtoniſhment, when, from the hard pulſe, great load at breaſt, pungent pain of the ſide, and ſeverity of the cough, I thought I had ſufficient warranty for adviſing it. Beſides, though theſe latter expectorated pretty large quantities of crude and thin, or more frequently of a gleety bloody matter, they were not at all relieved; whereas, when the former ſpit off largely and freely, it was of the higheſt advantage.

Now

Now I must farther take notice, that, cotemporary with both these disorders, a contagious, putrid, petechial fever, was very rife in and about this town, especially among the sailors and prisoners, and those that were very conversant with them; and it was chiefly among those sorts of persons that the malignant pulmonic fever raged. So that this seemed to be a complication of the common inflammatory peripneumony with the contagious petechial fever. The contagious effluvia acting on the blood in the manner of acrimonious salts, and destroying its crasis. It is certain we frequently meet with peripneumonies of this kind, merely from the sharp acrid state of the humours of those that are seized with them.

Now these are fevers, in which an inflammatory lentor is complicated with a greater degree of acrimony, or blended with a kind of poisonous dissolving effluvia. But we often meet with others, in which a very high acrimony of the humours is combined with a too lax state of the vessels, and too loosely compacted blood-globules; which is the case very commonly in petechial fevers, especially such as are attended with hæmorrhages.

I here beg leave to give the history of such an one, which I think was the severest that ever any one suffered under, who survived the disease. And the rather, as I shall specify the method of his cure; which not only in his case, but in several others of the like nature, though not degree, I have experienced to be highly beneficial; and which, I am persuaded, is the only successful course that can be used in them, however different it may seem from the common practice.

An eminent surgeon of a neighbouring town, of a thin and somewhat tender constitution, but constantly used to action and exercise, and frequently subject to fevers, and scorbutic rheumatisms, from taking cold, &c. in October 1741, fell into a kind of slow fever, attended with slight rigors, frequent flushes of heat, a quick weak pulse, loss of strength and appetite, with a great load at his breast, and a heavy sort of respiration. Notwithstanding this, he continued in his business, constantly riding, and fatiguing himself for some four or five days after this seizure. I met him at a gentleman's house, who was my patient, and finding him as above, and that his breath was, even then, very offensive, I earnestly desired him to take timely and due care of himself. Two days after, he, being at a gentleman's in the neighbourhood, was taken all on a sudden with a very great faintness, and fell off his chair; upon lifting him up, the company observed several livid and violet-coloured spots on his arms and neck. It was with very great difficulty they got him home, though but two or three miles distance, he very frequently fainting by the way. The disorder encreased every moment, he had a vast languor, with pain and extreme oppression on the præcordia, and a perpetual sighing; his breath now stank abominably, and a fœtid bloody matter leaked continually from his gums, and thousands of livid, violet, and black spots, appeared all over his body, on the trunk, as well as the limbs.

He was bled to about twelve ounces from his arm, but this gave him no manner of relief, the oppression, sighing, fainting, and anxiety, continuing as bad as ever, nay, rather increasing; a violent hæmorrhage also broke forth from his nose; which continuing from both nostrils, he was bled again to ten ounces about twelve hours after the former bleeding. Neither did this give him any relief, but encreased his weakness considerably, and he continued as anxious, restless, and oppressed as ever, without even the least sleep. The blood now not only issued from his gums and nose, but he also coughed up blood. Indeed the bleeding from his nose had ceased somewhat, but it encreased from his gums, and

and in a surprising manner. Blood now likewise dropped, though slowly, from the caruncle of one of his eyes; and several livid pustules on his tongue, and withinside his lips, broke, and discharged a bloody, thin matter very copiously.

The hæmorrhage being somewhat restrained, a bloody dysentary came on, with severe gripes, and excessive faintness, and he was still exceedingly restless, and very feverish. His pulse now intermitted every sixth or eighth pulsation, and then fluttered on again vastly quick; he had likewise a constant tremor and subsultus. The hæmorrhage all this while continued from one part or other, and when stopped at one place, forthwith burst out at another; so that his urine now seemed tinged with blood, being very dark-coloured, nay, almost black. Soon after he was bled the second time, I was sent for, and hastened to him. I found him in the manner described, under an inexpressible anxiety, yet quite free from a delirium, though he had no manner of sleep for several days and nights. His tongue was vastly black, and his breath so intolerably stinking, that it was greatly offensive even at a considerable distance; and his stools were so horribly nauseous and fœtid, that the very nurses fell into vomitings and faintness in carrying them off.

I found that neither of the portions of the blood that had been drawn (not even the first) had separated into crassamentum and serum as usual, though the former had stood so many hours; but continued as it were half coagulated, and of a bluish livid colour on the top. It was most easily divided by the slightest touch, and seemed a purulent sanies rather than blood, with a kind of sooty powder at bottom. His hæmorrhage still continued, especially from the tongue, lips, and gums, with a perpetual dripping of thin bloody ichor from his nose, so that he was reduced to an extreme degree of weakness, with never-ceasing tremblings, *subsultus tendinum*, and almost continual faintings.

What was to be done in this dreadful case? Would the hot, alexipharmic, volatile cordials and blisters have served him, as some might have imagined, considering his extreme weakness, faintings, load of the præcordia, tremblings, &c.? But would they not have been certainly deleterious, would they not have certainly killed him, as they would have added to the stimulating acrimony, encreased the fever, and farther destroyed the crasis of the blood, already nearly quite dissolved, and reduced to a kind of putrid gore?

I took it in this view, and as I had experimentally and repeatedly known the great use of the bark * in preventing and stopping the advance of gangrenes, I gave him frequently of it in small doses with elixir vitrioli, premising a small quantity of rhubarb. Besides this, he drank tincture of roses, with cinnamon water, made very acid, and also a decoction of Seville orange rind, red roses, cinnamon, and a little Japan earth (as it is called) well acidulated. Claret and red-port, with about half water, he drank at pleasure. As the bark sat easy with him, I continued its use, and encreased its quantity, giving with it some confect. fracast. sine melle, to restrain the dysenteric flux; and yet I now and then interposed a small dose of rhubarb, to carry off any bloody, bilious, or sanious matter that might be lodged in, or leak into the intestines. In the mean time, I ordered him to be frequently supported with rice, panada, sago, jellies of harts-horn well acidulated, toast out of claret, or red port wine; and I directed fomentations of aromatics and astringents, boiled in red wine, to be frequently applied to the whole abdomen.

By this method, steadily persisted in,

* Besides, I had formerly given the bark with success in the malignant petechial fever of 1735. Vid. Obs. de Aere et Morb. Epidem. Mense Maio.

was

was this poor gentleman, through divine goodness, raised from a state of universal rottenness, as it were, to perfect health; not but that, for a very considerable time after his fever was quite gone off, he continued extremely weak; and even after he was capable of walking abroad, the hæmorrhage from his nose would return on the least occasion, his gums would bleed on the slightest rubbing, and his breath continued very offensive for a long time. By the further use of the cortex, elix. vitrioli, &c. this also entirely ceased; but his legs and feet continued very much swoln for a much longer time, and his flesh all over the whole body remained exceeding soft, tender, and sore, scarce bearing the least touch. Rhabarbarate purges, easy stomachic chalybeates, elixir of vitriol, pyrmont water, with proper diuretics, and gentle regular exercise, at length carried off all those symptoms; and in about two or three months he recovered a good state of health, which he still enjoys.

I met with several of these petechial fevers, with hæmorrhages in the summer and autumn of 1745; particularly a gentlewoman, of Anthony, near Plymouth, was seized with such a fever, with symptoms nearly resembling those in the above-mentioned case, though not in so high a degree. She fell into an immense discharge from the uterus, though out of season, after a very profuse hæmorrhage from the nose; she bled also from the gums, and at last had a bloody dysentery. She had a strong phrenzy before the bleeding from the nose came on, and had a vast number of purple and black spots all over her body, some as large, at least, as a silver-penny. I treated her exactly in the manner aforesaid, and she happily recovered, though her legs were greatly swoln after it, and she continued in a long state of weakness. She was twice bled before I saw her; the first blood I saw not, but Mr. Freke, her surgeon, told me it was very florid and rich (as he called it) but very soft, and gave off a very small quantity of reddish serum. I saw the second, which was of a very dark black colour, covered with a very thin, tender, greenish skin. Her urine, during the whole time of the fever almost, was like white wine, or cyder, that stands long exposed to the air, and turns black; at length, however, a kind of a dark-coloured mealy sediment was deposited.

The fever, which attends gangrenes, is commonly of this kind, corrupting and dissolving the blood; the sanious matter of the gangrened part, being resorbed into the mass of blood, produces an universal gangrenous disposition in the humours, and dissolves the round red globules; whence spots, hæmorrhages, black tongues, delirium, &c. supervene. Celsus * justly observes, that an acute fever, delirium, great thirst, and stinking breath, accompany a gangrene; all signs of corruption of the blood, and high acrimony. I will instance but in one case, which, I think, is pretty uncommon in several circumstances.

Mrs. Elisabeth S——th, of St. Germain's, in Cornwall, about twenty-five, of a weak constitution, and bad habit of body, who never had any regular catamenia, was taken at the latter end of May, 1742, with a pain in the right foot near the toes, and with a torpor all over the leg, which hourly encreasing, she sent for Mr. Dyer, an ingenious surgeon at Looe, who rubbed the part with camphorated spirit of wine, and gave her some nervous and cordial medicines. This having no effect, he fomented with a very warm aromatic decoction, applying the magma with spirits, theriaca, &c. to the leg and foot; notwithstanding which, the parts grew soon discoloured, cold and quite insensible. When I came, I ordered the parts to be scarified, and that deeply, but not the least blood issued, only a few drops of quite black blood here and there slowly rose up, of the bigness of a pea; the skin and flesh

* Lib. V. Cap. 26.

looked

looked as if the leg had been cut off for some days, though this was but in the forenoon of the fourth day from the very first seizure. There were no vesications, nor did the scarifications afterwards emit the least stench, matter, or sanies. I immediately ordered her the bark with elixir vitriol. confect. Ralegh. and a warm acidulated julep, which she took freely, as she was vastly faint. A violent pain seized her in the afternoon in her right thigh and groin, and forthwith a fever, severe gripings, and a bloody flux, came on, which presently reduced her to the utmost degree of weakness, with perpetual faintings and agonies.

The ensuing night she grew very delirious, her tongue became quite black and faultering, her pulse exceeding quick, weak, and fluttering, with continual catchings of the tendons, and tremors. As the cortex did not sit well, but ran down, I gave her a strong tincture of it with decoct. fracastor. elix. vitriol. &c. which had a much better effect.

In this miserable condition she continued for three or four days, every one about her hourly expecting her death; however, the sphacelation did not advance, and never appeared above the knee, though a very vehement pain affected the whole thigh, and seemed chiefly in the periosteum of the bone. At length there appeared a dark livid streak or line all round the limb, immediately under the knee, and pointed out where nature was disposed to separate the dead part from the living. This tendency to separation became every day more and more visible, and the surgeon used all proper means to promote it: for whatever foundation there might have been for an amputation, neither she, nor her friends, would admit of it. In these deplorable circumstances (the dead part of the limb daily rotting off from the sound) she continued till July the 14th, when the surgeon, finding the slough cast off, and a separation at the joint almost perfectly made, took off, with a knife, the dead leg from the sound thigh, at the very articulation, with very little pain, without her consent, and almost without her knowledge of it, when it was done. Soon after this she daily recovered, and, by proper diet and medicines, was in a little time restored to a tolerable state of health.

CHAP. VI.

Of the difference between a slow nervous, and a putrid malignant fever.

I Cannot conclude this essay on fevers, without taking notice of the very great difference there is between the putrid malignant, and the slow nervous fever; the want of which distinction, I am fully persuaded, hath been often productive of no small errors in practice, as they resemble one another in some respects, though very essentially different in others. And this I the rather do now, as I have not sufficiently noted the difference in my *Dissertation de Febribus lentis & nervosis.* Nor do I know of any author, that hath done it explicitly, besides Dr. Langrish in his Modern Theory and Practice.

By what hath been said above, I think, it evidently appears, that in putrid malignant and petechial fevers, the blood, peculiarly so called, is affected; whereas the slow nervous fevers seem to have their seat chiefly in the lymphatic and nervous juices. Corruption of the humours, and dissolution of the blood, are in a high degree observeable in the former; but the slow nervous fever frequently runs on to a great length of time, without any considerable signs of putrefaction.

Besides, these two different kinds of fevers may be artificially produced, if I may so speak, by two very different kinds of diet, regi-

men, &c. and are too often actually effected. The hot, acrid, saline, volatile, and spicy food and medicines, very hot air, &c. will produce a putrid malignant: on the contrary, cold, watery, slimy, mucilaginous things, as cucumbers, melons, crude trashy fruit, vapid liquors, damp cold air, &c. bring on slow nervous fevers.

Could we suppose both the one and the other to arise from contagion, (which is commonly the case in pestilential and petechial fevers, and may sometimes be so in the slow nervous) I should liken the action of the morbific effluvia in the former, to that of the poison of a viper, which immediately affects and destroys the texture of the blood-globules, and brings on a very speedy corruption: but in the latter, to the virus of a mad dog, which works but slowly, and seems primarily to affect the lymph and succus nervosus, and manifests no signs of putridity, at least till the very close of the tragedy.

Now as these two fevers have a very different origin, they cannot but shew their effects in different symptoms, and require a very different method of cure; and yet I am very sensible, the one may be, and very often is, blended with the other; I mean, that a very acrimonious state of blood may subsist under a very weak, relaxed system of vessels, and may not shew itself with so much violence, as if the moving powers and vessels were more strong and elastic, and much more susceptive of the stimulus of the morbid acrimonious salts, &c. and of course more slow in its progress, though perhaps equally fatal. The different antecedent state of the fibres, and powers of nature, where contagion is the proximate cause of the disease, doth undoubtedly alter the nature of the subsequent fever very greatly. By carefully describing both these fevers, their nature and difference will more fully appear.

CHAP. VII.

Of the slow nervous fever.

I Begin with a description of the slow nervous fever, which hath been very exactly taken from too many, who have fallen victims to this insidious and dangerous enemy.

The patient at first grows somewhat listless, and feels slight chills and shudders, with uncertain sudden flushes of heat, and a kind of weariness all over, like what is felt after great fatigue: this is always attended with a sort of heaviness and dejection of spirit, and more or less of a load, pain, or giddiness of the head; a nausea and disrelish of every thing soon follows, without any considerable thirst, but frequently with urging to vomit, though little but insipid phlegm is brought up.

Though a kind of lucid interval of several hours sometimes intervenes, yet the symptoms return with aggravation, especially towards night: the head grows more heavy, or giddy, the heats greater, the pulse quicker, but weak, with an oppressive kind of breathing.—A great torpor, or obtuse pain and coldness, affects the hinder part of the head frequently, and oftentimes a heavy pain is felt on the top all along the coronary suture; this, and that of the back part of the head, generally attend nervous fevers, and are commonly succeeded by some degree of a delirium.

In this condition the patient often continues for five or six days, with a heavy pale sunk countenance, seeming not very sick, and yet far from being well; restless, anxious, and commonly quite void of sleep, though sometimes very drowsy and heavy: but although he appears to those about him actually to sleep, he is utterly insensible of it, and denies that he doth so.

The pulse, during all this time, is quick, weak, and unequal, sometimes

times fluttering, and sometimes for a few minutes slow, nay intermitting; and then, with a sudden flush in the face, immediately very quick, and perhaps soon after surprisingly calm and equal; and thus alternately. The heats and chills are as uncertain and unequal, sometimes a sudden colour and glow in the cheeks, while the tips of the nose and ears are cold, and the forehead at the same time in a cold dewy sweat. Nay, it is very common, that a high colour and heat appear in the face, when the extremities are quite cold.

The urine is commonly pale, and often limpid, frequently of a whey-colour, or like vapid small-beer, in which there is either no manner of sediment, or a kind of loose matter, like bran, irregularly scattered up and down in it. The tongue, at the beginning, is seldom or never dry or discoloured, but sometimes covered with a thin whitish mucus; at length indeed it often appears very dry, red, and chapped, or of the colour of pomegranate rind; but this mostly at the state, or close of the disease: yet, however dry the tongue and lips seem, the patient scarce ever complains of thirst, though sometimes of a heat in the tongue.

About the seventh or eighth day, the giddiness, pain, or heaviness of the head, become much greater, with a constant noise in it, or *tinnitus aurium*, which is very disturbing to the sick, and frequently brings on a delirium. The load on the præcordia, anxiety, and faintness, grow much more urgent, and they often fall into an actual deliquium, especially if they attempt to sit up; coldish sweats suddenly come on the forehead, and on the backs of the hands (though at the same time there is too much heat in the cheeks and the palms) and as suddenly go off. If the urine now grows more pale and limpid, a delirium is certainly to be expected, with universal tremors and *subsultus tendinum*; the delirium is seldom violent, but as it were a confusion of thought and action, muttering continually to themselves, and faultering in their speech: sometimes they wake only in a hurry and confusion, and presently recollect themselves, but forthwith fall into a muttering dozy state again.

The tongue grows often very dry at the state, especially in its middle part, with a yellow list on each side, and it trembles greatly when the sick attempt to put it out. When the tongue at this time grows more moist, and a copious spitting comes on, it is always a very good sign: but where a difficulty of swallowing, continual gulping, or choaking in the throat, supervene, it is a very dangerous symptom, especially if attended with any degree of singultus.

Frequently profuse sweats pour forth all at once about the ninth, tenth, or twelfth day, commonly coldish and clammy on the extremities; oftentimes very thin stools are discharged; both the one and the other are colliquative and very weakening. However, a warm moisture of the skin is generally salutary, and a gentle diarrhœa frequently carries off the delirium and comatose disposition.

Now nature sinks apace, the extremities grow cold, the nails pale or lived, the pulse may be said to tremble and flutter rather than to beat, the vibrations being so exceeding weak and quick, that they can scarce be distinguished; though sometimes they creep on surprisingly slow and very frequently intermit. The sick become quite insensible and stupid, scarce affected with the loudest noise, or the strongest light; though at the beginning strangely susceptible of the impressions of either. The delirium now ends in a profound coma, and that soon in eternal sleep. The stools, urine, and tears, run off involuntarily, and denounce a speedy dissolution, as the vast tremblings and twitching of the nerves and tendons are preludes to a general convulsion, which at once snaps off the thread of

life. In one or other of these ways are the sick carried off, after having languished on for fourteen, eighteen, or twenty days; nay, sometimes much longer.

All persons grow deaf and stupid towards the end of the disease (some extremely deaf) though too quick and apprehensive at the beginning, insomuch that the least noise, or light, greatly offended them. Many, from their immoderate fears, seem to hurry themselves out of life, where little danger was apparent at the beginning; nay, several will not suffer themselves to sleep, from a vain fear of dozing quite away; and others, from the vast hurry, anxiety, and confusion, they are sensible of in it, or at their awaking. Where the deafness ends in an imposthume of the ear, it is generally a good symptom; and so it is also when a parotis suppurates, or a large pustular angry eruption breaks out about the lips and nose.

This is a description (tedious indeed, but pretty exact) of the slow nervous fever in its most aggravated circumstances. Wherein I have laid down the symptoms in the order in which they naturally come on; and this I think should be always observed in describing any disease. It most commonly attacks persons of weak nerves, a lax habit of body, and a poor thin blood; those who have suffered great evacuations, a long dejection of spirits, immoderate watchings, studies, fatigue, and the like; and also those who have used much crude unwholesome food, vapid impure drinks, or who have been confined long in damp, foul air; that have broken the vigor of their constitutions by salivations, too frequent purging, immoderate venery, &c. Whence I think it is evident, this disease arises from a too relaxed state of the solids, a poor weak blood, and a lentor and vapidity of the lymphatic and nervous juices. The very method of cure shews this, which consists in mild, stimulating, attenuating, and proper cordial, strengthening diet and medicines. Hippocrates somewhere notes, that the successful method of cure shews the nature of the disease.

Let us now, therefore, endeavour to shew the properest method of curing the fever.

It was another maxim of the great Hippocrates, that whoever knows the nature of the disease, knows the method of cure.* It is at least the indispensable duty of every physician, before he prescribes for his patient, to consider well his constitution, and the nature of his disease; for as Celsus elegantly says, *Æstimatio causæ sæpe morbum solvit.*† And this is in no case more necessary that in fevers, in which the time is short, and experiments dangerous. Where the disorder doth not attack with great violence, it is better to wait a little, and observe the motions of nature, than be too precipitate. But it is rare that physicians are called in at the very beginning of slow fevers. Indeed, they are often too far advanced ere they are consulted.

From the history of the slow nervous fever, I think it is very evident that no great evacuations are proper (especially bleeding) particularly in persons of originally weak and lax constitutions, who are by far the most subject to it. I have known a common purge, injudiciously given at the beginning of this fever, immediately followed by surprising languors, syncope, and a large train of other ill symptoms. However, it may be necessary sometimes, even at the beginning, to cleanse the *primæ viæ*, by a gentle puke, a little rhubarb, manna, &c. If you give any thing drastic, be assured your patient will rue for it, and you will repent it. And here I cannot but observe, that a mild vomit may be given with much less ruffle to nature than a common purge, and indeed is useful, nay necessary, where nausea, load, and sickness at stomach, are urgent; which

* Lib. de arte sub finem. † Celsi Præfat. sub finem.

frequently

frequently happen at the attack of this fever. Clysters of milk, sugar, and salt, may be injected with safety and advantage every second or third day, if nature wants to be prompted to stool.

The temperate, cordial, diaphoretic medicines, are certainly most proper in these fevers; and a well-regulated, supporting, diluting diet, is necessary. The latter of itself, judiciously managed, will go a great way in the cure, especially assisted by well-timed and well-applied blisters, and a due care to keep the patient as quiet as possible, both in body and mind. But it should be noted, that any strong opiates are commonly very pernicious, however want of sleep and a great restlessness may seem to demand them. Mild diaphoretics, as pulv. contrayerv. comp. with a little castor and saffron, and small quantities of theriac. Andromachi, or elixir paregoricum, have much better effects; which, by raising a gentle easy sweat, or at least a plentiful perspiration, calm the hurry and tumult of the blood and spirits, whence soft refreshing slumber succeeds. Where the confusion and dejection of spirits are very considerable, galbanum or silphium, with a little camphor, should be added; and blisters should be forthwith applied to the neck, occiput, or behind the ears; and during all this, a free use of thin wine-whey, some pleasant ptisan, or gruel, with a little soft wine, must be indulged. Indeed the patients, in this case, should drink frequently: though such quantities may not be necessary as in the ardent or even putrid malignant fevers; yet they should be sufficient to carry on the work of dilution, support the sweats, and supply the blood with fresh and wholesome fluids, in lieu of the vapid, acrid latex, that is continually passing off. And I think, in this view, a thin chicken broth also is of service both as food and physic, especially towards the decline of the disorder; and for the same reason thin jellies of harts-horn, sago, panada, are useful, adding a little wine to them, and the juice of Seville orange or lemon.

It is observable, the sick are never so easy as whilst they are in a gentle easy sweat; for this soon removes the exacerbations of heat, hurry, &c.—But profuse sweats should never be encouraged, much less attempted by very strong heating medicines, volatile alcalious salts, spirits, &c. especially in the beginning, or advance of the fever; for they too much exhaust the *liquidum vitale*, and are followed by a vast dejection of spirits, tremors, starting of the tendons, and sometimes end in rigors, cold clammy sweats, syncope, or a comatose disposition. Sometimes irregular partial heats and flushes succeed, with great anxiety, restlessness, delirium, difficulty of breathing, and a vast load and oppression on the *præcordia*; so as to incline the less cautious observer to think there may be something peripneumonic in it. But even here beware of bleeding, for you will find the pulse very small and unequal, though very quick: Not only the weakness and fluttering of the pulse contra-indicate bleeding, but also the pale, watery, limpid urine, which is commonly attendant. These symptoms denote the load, anxiety, and oppression on the *præcordia* to be from the nervous orgasm, not from a peripneumonic obstruction, or inflammation: the breathing in this case, though thick and laborious, is not hot, but a kind of a sighing, or sobbing respiration, nor is there many times any kind of cough concomitant; so that this is really from some degree of spasm on the vitals, not from inflammation. And this is very manifest in hysteric paroxysms.

Here therefore the nervous cordial medicines are indicated, and blisters to the thighs, legs, or arms. I commonly use the following bolus and saline draught.

℞ *Pulv contrayerv. c. gr.* xv. *—*Croc. Anglic. gr.* iii.—*Confect. Raleigh.*

* When vast tremors and subsultus tendi-

Ralegh. ℈i.—*Syr. croci. q. s. m. f. bolus.*

℞ *Sal. C. C.* ℈ss.—*Succ. limon.* ℥iii.—*Aq. alexit. simpl.* ℥iss.—*m. perucià effervescentià ana sp. lavend. c. syr. croci, ana* ℥iss. *m. f. haust.*

These, or the like, I order every 5th, 6th, or 8th hour, and a temperate cordial julep; *spiritus volatilis aromat.* or *fœtidus*, may be now and then given out of thin wine, or cyder-whey, or, which is in many cases better, out of thin mustard-whey; which, without any more pompous apparatus, s not a contemptible medicine, especially for the poor. These gently stimulate the torpid vessels, and raise their oscillatory powers; they attenuate the humours and dilute them, and by these means promote easy relieving sve ts, which soon carry off the *erethismus*, as the ancients called it. The saline draught, prepared as above, is much more apt to pass by the pores of the skin than when made with salt of wormwood, which rather moves through the urinary passages. When I assert, from repeated experience, the use of the above-described draught in asthmatic cases, any one may easily judge of its efficacy in these.

But to return, this difficulty of breathing, anxiety, and oppression, many times precede a miliary eruption, which often appears the seventh, ninth, or eleventh day of this fever, and sometimes later: indeed, great anxiety and oppression on the *præcordia* always precede pustular eruptions of any kind, in all sorts of fevers. Every one must know how ill-timed and improper bleeding would be on such on occasion, when the greatest care should be taken not to retard nature's operation in this particular, which is many times completely critical: on the contrary, it should be promoted by soft easy cordials, proper diluents, and the like; and to these sometimes a little theriaca Andromachi, or elixir asthmaticum, should be added; which not only tend to calm the universal uneasiness commonly complained of, but also very effectually promote a diaphoresis, or breathing kindly sweats, with which the miliary eruptions freely and easily advance.

But however advantageous these commonly are, profuse sweats are seldom or never so, even though attended with a very large eruption; for I have known two or three crops of miliary pustules succeed one another, and large sweats, long continued, with no manner of relief to the patients; nay, of very great detriment, as they reduced them to an extreme degree of weakness. In truth, these large sweats are much more commonly symptomatical than critical, and the consequent eruption is very often the mere symptom of a symptom; for the miliary glands of the skin appear very turgid, and mimic a rash upon profuse sweating, even in the most healthy.

In such profuse colliquative sweats, I have very frequently given a little generous red-wine (diluted somewhat, if necessary) with the greatest advantage; it presently moderating the sweat, supporting the patient, and keeping up also the miliary papulæ, if they happen likewise to attend.—Celsus advises *vinum austerum meracum in morbo cardiaco*,* which I take to have been a species of nervous fever with colliquative sweats. Towards the decline of the fever, where the sweats are abundant and weakening, I moreover give small doses of the tincture of the bark, with saffron and snake-root, hereafter described, interposing now and then a dose of rhubarb to carry off the putrid colluvies, in the first passages; which withal makes the remissions, or intermissions, which frequently happen in the decline of nervous fevers, more distant and manifest, and gives a fairer opportunity for preparations of the

num come on, I use musk half a scruple instead of the pulv. contrayerv. c. with great success.

* Lib. III. Cap. 19.

the bark. I generally give it, about this time, out of the saline draughts made with salt of wormwood and juice of lemons, which makes them much more effectual. I am persuaded this method will shorten these fevers, even those with miliary eruptions, which too often run on to an exceeding great length, and are frequently attended with dangerous relapses. I have more than once known patients sick under this fever, after having been kept in a sweating method for five or six weeks together, and after having gone through three or four successive crops of miliary eruptions (as they are called) they all the while melting away, and weltering in their own sweat, and the bed rotting under them.

Though a gentle diarrhœa is sometimes of manifest service towards the end of this fever, crude, thin, colliquative stools, are very far from being so, but sink the sick surprisingly fast. Where they are livid, or of a kind of lead colour, whatever be the consistence, it is a dangerous appearance.

There is no evacuation of a more favourable portent, than a pretty free salivation without aphthæ; where this happens, with a kindly moisture of the skin, I never despair of my patient, however weak and stupid he may seem. Indeed, the deafness many times makes the sick, at the close of the distemper, appear much less sensible than they really are; not but that many, under these circumstances, escaping the grave, degenerate into mere idiots.

Under any of these evacuations, plentiful, supporting, diluting nourishment, is absolutely necessary to keep up the spirits, and repair the loss of the daily wasting juices, and mend the remaining. Indeed, when the patients are too heavy and stupid, they should be very frequently prompted to it; for it is even altogether as necessary as medicine.

We have very seldom any thing completely critical in this fever; in many cases only time itself seems to wear it off. The urine is scarce ever concocted, but crude, pale, and thin, through the whole course of the disorder, and frequently much too profuse; sometimes, indeed, after the exacerbations, or in the sweats, it is higher coloured, but without sediment, small in quantity, and commonly greasy, as it were.

It seems to me evident, that too great a lentor of the lymphatic and most exalted juices of the body, is one of the conjunct causes of slow nervous fevers; and I conceive, that as the serum, when once coagulated by feverish heat, never resolves into any fluid fit for the uses of the animal œconomy, but turns into an acrimonious putrilage; so the ropy stagnant lymph corrupts by degrees into a putrid ichor, which must be discharged from the body by its common outlets, or some artificial drains.

Though the pores of the skin, and the salival ducts, are found in general to be the most advantageous ways, yet it often partly runs off also by the intestines and urinary passages. Now though these discharges are many times very profuse, it is found by experience they are not to be too hastily suppressed, without causing a very dangerous translation of the morbid matter on the vital parts; a sudden check of the sweats being most commonly attended with convulsive rigors, vast uneasiness and oppression on the præcordia, syncope, &c. as nausea, sickness at stomach, colicks, and a delirium, are the common effects of potent astringents, prematurely administered. Nay, the blisters in this case are not to be hastily dried up; the more they discharge generally so much the better; and even if they ulcerate somewhat, it is commonly no unfavourable symptom; for though it may shew the acrimony of the humour drained off, it is a proof that nature hath strength enough to expel it. So that when the first blisters begin to heal up, others should be applied to other parts; for it is not merely

merely from the ſtimulus, but alſo from the drain they make, that they are ſerviceable. The large angry puſtules, that often break forth at or after the ſtate of this fever, and frequently ulcerate and run largely, are a kind of natural bliſters, which give vent to the putrid corroſive ichor, and ſufficiently indicate one way of giving nature relief.

Upon the whole, then, where any of theſe diſcharges are very immoderate, they may be prudently reſtrained, but not repelled; and therefore cold air, cold linen, cold liquors, or a cold regimen, are greatly improper. And yet to be always labouring by very hot cordials, volatile alcalious ſalts, and very hot air, to raiſe ſweats, and to continue them, is really melting, not mending your patient. And as to a vaſt number, and repeated eruptions, of the white and red miliary pimples, they not only ſhew the quantity of the diſeaſe (as we call it) but many times alſo the wrong meaſure of the phyſician. Do we ſucceed the better for throwing out a vaſt number of the ſmall-pox by a very hot regimen? And yet the latter bids much fairer for a completely critical diſcharge than the former. And I appeal to all experienced phyſicians, whether they ever ſaw large and profuſe ſweats of any ſervice in the ſmall-pox or meaſles: I am ſure I have very many times found them highly detrimental.

I have been the larger on this head, as I am fully perſuaded the common method of treating miliary fevers by very hot ſweating medicines and regimen, hath been the bane of thouſands. In a word, whether in miliary fevers, or the ſlow nervous without eruptions, the ſole end of medicine ſhould be to aſſiſt nature in her operations, and ſupport her under them; but in ſuch manner as may comport with the general laws of the animal œconomy; promoting by art where the diſcharges are deficient by nature, or reſtraining when profuſe and inordinate; taking care at the ſame time never to pervert, in any particular diſeaſe, any particular criſis, which by juſt obſervation, and long experience, hath been found regular, conſtant, and ſalutary, but always to favour it. Thus, to give an inſtance in the fever now treated of; when a diarrhœa happens too profuſe, it may be reſtrained by a gentle cordial opiate, as theriaca Andromachi, or the like, which, by quieting the irritation and promoting the cuticular diſcharge, moderates the flux; for gentle, eaſy, breathing ſweats, are always found advantageous. To ſtop it at once, by very ſtrong aſtringents, is to pervert nature's endeavours, as they tend to prevent both ſtool and ſweat. But whoever will be more fully informed of the method of treating the ſlow nervous fevers, may conſult a late judicious treatiſe of Sir Richard Manningham, on the Febricula, &c.

CHAP. VIII.

Of putrid, malignant, petechial Fevers.

LET us next take a view of the putrid, malignant, or peſtilential, petechial fevers, and then proceed to offer ſome few directions as to the method of cure.

The highly putrid, malignant, and even petechial fevers, many times ariſe from mere antecedent acrimony of the blood, agitated by the ſupervening fever, yet generally the peſtilential and petechial have their origin from contagion; and may therefore affect perſons of all conſtitutions, which will of courſe produce a great diverſity in the ſymptoms. For, as the received contagion acts nearly in the ſame manner as acrimony, it will have very different effects, when it invades a ſtrong vigorous conſtitution, and a rich ſizy blood, from what it will when it attacks a weak lax habit with a poor thin blood, and

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a too loose *crasis* of its globules; and from one and the other, when it falls in with a very acrimonious mass of humours.

In general, however, these fevers attack with much more violence than the slow nervous, the rigors, if any, are greater (sometimes they are very great) the heats much sharper and permanent, yet at first sudden, transient and remittent; the pulse more tense or hard; but commonly quick and small, though sometimes slow and seemingly regular for a time, and then fluttering and unequal. The head-ach, giddiness, nausea, and vomiting, are much more considerable, even from the very beginning. Sometimes a severe fixed pain is felt in one or both temples, or over one or both eye-brows, frequently in the bottom of the orbit of the eyes. The eyes always appear very full, heavy, yellowish, and very often a little inflamed. The countenance seems bloated and more dead-coloured than usual.

Commonly the temporal arteries throb much, and a *tinnitus aurium* is very troublesome. A strong vibration also of the carotid arteries comes on frequently in the advance of the fever, though the pulse at the wrist may be small, nay even slow. This is a certain sign of an impending delirium, and generally proceeds from some considerable obstruction in the brain.

The prostration of spirits, weakness and faintness, are very often surprisingly great and sudden, though no inordinate evacuation happens; and this too sometimes when the pulse seems tolerably strong. The respiration is most commonly laborious, and interrupted with a kind of sighing, or sobbing, and the breath is hot and offensive.

Few or none of these fevers are without a sort of a lumbago, or pain in the back and loins; always an universal weariness, or soreness, is felt, and often much pain in the limbs. Sometimes a great heat, load, and pain, affect the pit of the stomach, with perpetual vomiting of porraceous or black choler, and a most troublesome *singultus*; the matter discharged is frequently of a very nauseous smell.

The tongue, though only white at the beginning, grows daily more dark and dry; sometimes of a shining livid colour, with a kind of a dark bubble at the top; sometimes exceeding black; and so continues for many days together; nor is the tinge to be got off many times for several days, even after a favourable crisis. At the height of the disease it generally becomes very dry, stiff, and black, or of a dark pomegranate colour.——Hence the speech is very inarticulate, and scarce intelligible.

The thirst in the augment of the fever is commonly very great, sometimes unquenchable; and yet no kind of drink pleases, but all seems bitter and mawkish. At other times, however, one is amazed to find no thirst complained of, though the mouth and tongue are exceedingly foul and dry; this is always a dangerous symptom, and ends in phrenzy or coma.—The lips and teeth, especially near the state, are furred up with very black tenacious sordes.

At the onset of the fever the urine is often crude, pale, and vapid, but grows much higher coloured in the advance, and frequently resembles a strong *lixivium*, or citrine urine, tinged with a very small quantity of blood; it is without the least sediment, or even cloud, and so continues for many days together. By degrees it grows darker, like dead, strong, high-coloured beer, and smells very rank and offensive.—I have frequently seen the urine in petechial fevers almost black, and very fœtid; particularly that of one Mr. Shirley, a sea-surgeon, was almost quite black, with a sediment as dark as soot. He had abundance of very black spots, vibices, bloody dysentery, and comatose phrensy, and died about the thirteenth day.

The ſtools, eſpecially near the ſtate, or in the decline of the fever, are for the moſt part intolerably ſtinking, green, livid, or black, frequently with ſevere gripes and blood.—When they are more yellow or brown, the leſs danger; but the higheſt, when they run off inſenſibly, of whatever colour. It is likewiſe a very bad ſymptom when the belly continues hard, ſwoln, and tenſe, after profuſe ſtools; for this is generally the conſequence of an inflammation, or mortification of the inteſtines.—A gentle diarrhœa is often very beneficial, and ſometimes ſeems to be the only way nature takes to carry off the morbific matter.

When black, livid, dun, or greenifh ſpots appear, no one doubts of the malignity; the more florid, however, the ſpots are, the leſs it is to be feared. It is a good ſign when the black or violet *petechiæ* become of a brighter colour.—The large black or livid ſpots are almoſt always attended with profuſe hæmorrhages.—The ſmall duſky brown ſpots, like freckles, are not much leſs dangerous than the livid and black; though fluxes of blood do but ſeldom accompany them. Exceſſively profuſe, cold, clammy ſweats, are often concomitant, by which alſo they ſometimes vaniſh, though without any advantage to the patient.—The eruption of the *petechiæ* is uncertain, ſometimes they appear the fourth or fifth day, ſometimes not till the eleventh, or even later.—The vibices, or large vivid or dark greeniſh marks, ſeldom appear till very near the fatal period.—We frequently meet with an efflorescence alſo, like the meaſles, in malignant fevers, but of a more dull and lurid hue, in which the ſkin, eſpecially on the breaſt, appears as it were marbled or variegated. This in general is an ill ſymptom, and I have often ſeen it attended with very fatal conſequences.

Sometimes about the eleventh or fourteenth day, on the coming on of profuſe ſweats, the *petechiæ* diſappear, and vaſt quantities of ſmall, white, miliary puſtules, break out. I have ſeldom ſeen this of very conſiderable advantage; but, if an itching, ſmarting, red raſh, it commonly greatly relieves the ſick; and ſo do the large, fretting, watery bladders, which many times riſe up on the back, breaſt, ſhoulders, &c. A ſcabby eruption likewiſe, about the lips and noſe, is certainly one of the ſalutary ſymptoms; and the more hot and angry, it is ſo much the better.—But of much more uncertain and dangerous event are the brown dark-coloured *aphthæ*; nor are thoſe that are exceeding white and thick, like lard, of a very promiſing aſpect. They are ſoon ſucceeded by great difficulty of ſwallowing, pain and ulceration of the *fauces*, *œſophagus*, &c. and with an inceſſant *ſingultus*. The whole *primæ viæ* become at laſt affected, a bloody dyſentery comes on, followed by ſphacelation of the inteſtines, as is evident from the black, ſanious, bloody ſtools; horribly fœtid, and extremely infectious.

Vibices, or large black and bluiſh marks reſembling bruiſes, are frequently ſeen towards the cloſe of the fever; and when attended with lividity and coldneſs of the extremities, are certain tokens of approaching death: I have ſeen the blackneſs reach almoſt to the very elbows, and the hands dead-cold for a day or two before the death of the patient. A remarkable inſtance of this kind I met with ſome years ſince in one Mrs. Hopkins, to whom I was called the ſeventh day of her illneſs. She was ſtupid and ſomewhat delirious, perpetually ſighing, as if under the extremity of grief, and complaining of infinite load and oppreſſion at her heart. She had a very quick, ſmall, trembling, unequal pulſe, and a ſhort, catching, laborious breathing; ſhe had no manner of ſleep for a long time, and yet lay very ſtupid. She had no great heat, though inſatiably thirſty; the tongue was not very dry, but blackiſh; her throat was ſomewhat ſore, and ſhe ſwallowed with difficulty; her eyes were ſtaring, fixed,

ed, and inflamed.—The eighth day she had exceeding profuse sweats, her tongue grew quite black, or rather livid, and extremely dry. In the evening the *catamenia* broke forth and became very immoderate (she was a nurse, and this was the first time they appeared since her delivery) the sweats continued, and were of very ill smell. The ninth they discovered *vibices*, or large black spots on several parts of her body; one in particular on the top of her nose, and another on the bridge of it, which turned quite black, as did a large blotch on each cheek nearly of the breadth of a crown-piece.—The tenth the *catamenia* ceased, she fell into a violent purging, her belly swelled exceedingly, her nails and hands grew very black and as cold as marble, the urine and stool ran off involuntarily, she lay altogether insensible till the eleventh day, and then died. An intolerable stench arose from her at least forty hours before her death, though kept clean with all possible care.

I am very sensible, the word *malignant*, as applied to fevers, hath of late years fallen into very great disrepute, and probably it hath been often made use of to cover ignorance or magnify a cure. But there is really a foundation in nature for such an appellation, at least for some word, that may distinguish such a disease, as I have been now describing, from a common inflammatory fever; indeed the very term *inflammatory fever* supposes there are other kinds of fevers. It is perhaps indifferent whether you call them putrid, malignant, or pestilential. When *petechiæ* appear, every one calls them spotted or petechial, and if from contagion, contagious. I will contend with nobody about words, but it is necessary we should have some to communicate our ideas, and, where they are well defined, no one hath great reason to quarrel with them.

I have the utmost honour for the memory of the great Sydenham; and yet, I must say, had he not treated all fevers as merely inflammatory, even the plague itself, his practice had been more universally just and imitable, as being extremely well adapted to those who depend on an inflammatory lentor.—But surely it is not always to be followed, even in the small-pox, which in general he hath admirably well described and most judiciously treated. Without all doubt there are fevers, that require something more than the lancet, small-beer, and a purge. Is the low nervous fever to be treated so? Are some kinds of small-pox and petechial fevers, the miliary, &c. to be so managed? I appeal to all experienced and rational practitioners. But honour to whom honour is due. He justly opposed and exploded the hot, sweating, fiery regimen, which was then commonly used in all kinds of inflammatory and ardent fevers. Yet mere evacuations, and cold watery diluters, will not indifferently suit all sorts of constitutions and fevers. But opposition is commonly carried too far, and a favourite notion may sometimes lead one to extinguish almost the vital flame, and another to fire the fabric, lest the deleterious *miasmata* should make a lodgement in it.

If a fever be an effort of nature to throw off some offending or morbid matter, as most certainly it is, surely it will not be always proper to check it. The hot fit of a tertian, by attenuating the lentor of the humours, and removing the obstructions in the extremities of the capillary arteries, terminates the paroxysm. Improper bleeding and purging often protract it greatly, and make it both anomalous and dangerous. When the contagion of the small-pox is received into the blood, it produces a fever, which in a mild kind of them soon ends in a complete eruption, and thence ceases; the fever, or the effort of nature, having expelled the morbific matter. But many times, from profuse evacuations, immoderate fear, sinking of the spirits, and improper management, she hath not sufficient

vigour to expel the diſeaſe by a proper criſis; but the puſtules are pale, wan, ſeſſile, and remain crude and without any regular maturation. And this often is the caſe in other eruptive fevers, even the plague itſelf.

The reaſon we have to bleed, therefore, in the beginning of ſuch fevers, is to prevent the fever from running too high, and producing inflammations of the brain, lungs, or other vital parts; which a great fulneſs of rich denſe blood, violently moved and heated, is very apt to bring on.—In truth, bleeding in a contagious diſeaſe, as ariſing merely from contagion, ſeems not indicated; becauſe the contagion is intimately mixed with the humours, and, by drawing off a ſmall part of the blood, you very little leſſen the whole contagion, which will have its effect, more or leſs, whether you bleed or bleed not. And we find, by the experiment of inoculation, that the leaſt quantity of the variolous matter, introduced into the blood, will produce the ſmall-pox: and we ſee the ſame in other caſes, whether the bite of a viper or mad dog; in the latter of which, by the bye, a ſmall wound is generally found worſe than a large lacerated one, becauſe this gives a more free vent again to the poiſon.

When you have intimately mixed any ferment with a liquor to be fermented, you cannot deſtroy the fermentation by drawing off part of the liquor; for every part of the liquor, when in fermentation, is a ferment. So contagion, received into the blood, operates on and in every part of it. By cooling, indeed, adding acids, &c. you may moderate the fermentation; and when it is too violent, you may prevent the ſplitting of the veſſel (if too full and cloſe ſhut) by giving proper vent. So in contagious fevers, by drawing off blood you may leſſen its quantity, and prevent it from over-diſtending, inflaming, and rending the veſſels, and leſſen the heat; which might otherwiſe very greatly augment the force of the contagion, and turn the whole maſs of humours into a mere inflammatory glew.—But if, to carry on the ſimile, you cool the fermenting liquor too much, and prematurely ſuppreſs the fermentation, you render the whole vapid and ropy, and it never puriſies itſelf by a proper deſpumation, or becomes a good vinous liquor. Thus when contagion is received, if you weaken the powers of nature too much by bleeding, &c. and hinder her operations in deſpumating (as Sydenham calls it) the morbid humours, you concentrate the diſeaſe; which turns the whole maſs of blood into a putrid ichor, or ſanies. However, as bleeding may leſſen the fewel, though it doth not extinguiſh the contagious fire, it is highly proper where there is a redundance of blood. But yet the infection will have its effect; and I have ſeen as numerous and as bad a kind of ſmall-pox, after profuſe bleeding, as ever I did when it had been omitted. It is certain, moreover, that the plague, which ſtands firſt in the liſt of contagious fevers, will very ſeldom bear bleeding, to any degree at leaſt, as appears from the very beſt authorities.

But let us finiſh this chapter with a few words on the curative intentions, proper in the fevers which it particularly treats of. And here firſt let me note, that though malignant and peſtilential fevers, at the very onſet, greatly ſink the ſpirits, and cauſe ſurpriſing and ſudden weakneſs, eſpecially when from contagion; yet bleeding to ſome degree is moſt commonly requiſite (nay, neceſſary in the ſtrong and plethoric) not only to leſſen the *moles movenda*, and give a freer play to the oſcillating veſſels, but alſo to prevent any inflammatory obſtructions, which may form in the very beginning, and likewiſe to moderate the friction and heat, which are often very conſiderable for the firſt days of the diſorder, and which more and more exalt the ſalts and ſulphurs of the blood, encreaſe the acrimony and putreſcent ſtate of the humours, and greatly

greatly favour the action of the morbific matter. This, therefore, when indicated, should be done as early as possible. A quick tense pulse, sharp heat, great difficulty of breathing, palpitation of the heart, and violent pain on the head and back, evidently demand it. But it should be duly observed, that though a rigor precedes the heat, and the oppression on the *præcordia* be very considerable, yet much less blood should be taken off than in a true peripneumony, which oftentimes makes its attack much in the same manner. But the sudden weakness and great dejection of spirits, the trembling of the hands, the paleness and crudity of the urine, together with the absence of a cough, and heat of the breath, which attend true peripneumonic fevers, distinguish the one from the other. Besides, this affair is less liable to be mistaken, when putrid, pestilential, or petechial fevers are common, and the constitution of the air disposeth to them. Whatever be the case, the blood drawn will soon shew the difference, which, in malignant fevers, is of a much more loose contexture, and softer consistence (though it may appear very florid) than that of pleuritics, or peripneumonies; which, though it may at the first bleeding appear very bright, and without a tough white pellicle on it, especially if it trickles down the arm, and doth not run off in a full stream, yet when cold, it will form into a very firm and dense *crassamentum*. When you find it quite otherwise, be cautious, in all cases, and not too prodigal of the vital fluid.

Now, though it may be necessary to bleed the strong and robust at the very beginning of contagious fevers, yet we should have a very careful regard to the nature of the fever, as arising from contagion, which seems to affect not only the blood, but primarily also the animal spirits. I think the sudden damp, weakness, tremblings, and great dejection of spirits, at the very attack, evidently shew it. In some plagues, persons have been struck dead as with a blast of lightning, without any precedent fever, or even indisposition. It is impossible to account for the immediate operation of the bite of a rattlesnake, which kills often in less than a minute or two, on any other supposition; nor for the surprisingly sudden effects of some smells on some persons, which almost instantaneously throw the whole frame of nature into the utmost confusion, and even convulsion. The now well-known effects of the stroke of electric effluvia, not only seem to confirm this notion, but also shew the analogous manner in which it is done. Whoever would see more of this, may consult the illustrious Dr. Mead's Introduction to the third edition of his Essay on Poisons.

But the nerves and animal spirits, being affected by the contagious *miasmata*, do not sufficiently and regularly actuate the muscular fibres and vessels; whence arises great debility, and too weak a vibration of the vascular system; and hence the blood in some places runs into grumous concretions, and in others is quite dissolved.—The heart and its auricles are found vastly distended with grumous blood in those that die of the plague, the blood recoiling upon the heart, which hath not sufficient power to protrude it. But yet the blood in the other vessels appears vastly thin and dissolved, insomuch that it frequently runs off *qua data porta*.—Timoni,* and others, observe that it is exceedingly difficult to stanch it at the orifices made by bleeding and cupping. This I have likewise many times observed in common petechial and pestilential fevers.

From the peculiar disposition of the nervous filaments, and that of the most subtile and exalted part of the animal fluids, which so greatly differs in different persons, arises that astonishing diversity of affections, even from the very same cause. The smell of an herb, flower, musk, that refreshes

* See Philosoph. Transact. No. 364.

freshes thousands, makes some particular people faint. The stroke of electric effluvia affects different persons in a very different manner, at least in very different degrees; probably not only from the different crasis of the animal spirits, but also from the different tension, strength, &c. of the nervous *fibrillæ*; as musical strings, of different length and tension, will be very differently affected by the same note. It may perhaps, in part, be owing to the peculiar disposition of the nerves and animal spirits, that some are very readily infected by the plague, small-pox, &c. and some never, although multitudes suffer around them.

But be this as it will, the contagion certainly weakens the force of the solids, and tends to dissolve the blood; so that, when we have a suspicion that a fever arises from contagion, we should proceed with caution in letting blood, even though the symptoms may run pretty high at the beginning, and seem to demand the taking off a pretty large quantity. In malignant pleuro-peripneumonies and peripneumonies, I have too often seen, and been sorry for, very untoward mistakes in this matter, particularly in the years 1740, 1741, and 1745. And therefore, though the first bleeding may be very proper, the subsequent may not be so, nay, pernicious.

The first blood generally appears florid; what is drawn twenty-four hours after, is commonly livid, black, and too thin; a third quantity livid, dissolved, and sanious. This is frequently the case in malignant petechial fevers. I have sometimes observed the crasis of the blood so broken as to deposit a black powder, like soot, at the bottom; the superior part being either a livid gore, or a kind of dark green and exceedingly soft jelly. Besides, the pulse, in these cases, sinks oftentimes surprisingly after a second bleeding; nay, sometimes after the first. And this I have more than once noted to my great concern and astonishment, and that even where I thought I had sufficient indications from the pulse, &c. to draw blood a second time. So necessary is it therefore to have a due regard to the peculiar nature of an epidemic fever.

Scarce any infectious fever makes an attack on any person, without bringing on a sickness at stomach and vomiting. As the morbific effluvia are swallowed with the *saliva*, &c. may they not, in part at least, be washed off and rejected, by co-operating with nature, in promoting the vomiting?—By which also any bilious, acrid, putrid *colluvies*, that may lie in the stomach, is carried off; which otherwise, by growing more and more corrupt, would produce a variety of ill symptoms, and greatly encrease the original disease. Besides, nature many times strives in vain to discharge by vomit without the assistance of art, and yet as violently as when a proper emetic, and a proper wash, are made use of. Nay, drinking something to promote the vomiting makes it both easier and much more effectual, and by carrying off the irritating matter tends greatly to stop the vomiting. But then I would have this done always by very gentle means, such as infusion or decoction of *ipecacoanha*, *oxymel scilliticum*, with a slight infusion of camomile flowers, or the like. The method of vomiting by mere warm water I do not approve of, as you are often obliged to swill down immense quantities before you can raise the vomiting, which sometimes overloads the stomach to such a degree, that its force is not sufficient for the weight laid on it, and cannot reject it; so that the more you drink, the less capable it is of doing its office. And thus, being over-distended, it becomes quite inactive, whence dreadful effects may follow. In all cases, therefore, if no vomiting follows after having drank a pint or two, sollicit a discharge with your finger or a feather, and by all means beware of that deluge of drink which is too often

often very preposterously given. I think, by the way, the observation, that the stomach is utterly inactive, and cannot reject any thing when over-distended, just as the urinary bladder when over-full cannot render any urine, shews that vomiting is not solely from the action of the diaphragm and abdominal muscles, as Mons. Chirac and others suppose; for their utmost efforts many times produce no manner of effect on an over-full stomach or bladder. In the latter, we are frequently obliged to have recourse to the catheter.

If the vomiting continues, after the stomach is washed out, give a little *theriaca Andromachi* out of an appropriate stomachic mixture, as salt of wormwood, juice of lemons, mint-water, &c. and apply an aromatic fotus, or rather a catalasm of *species aromaticæ* with *theriaca*, which most times succeeds when every thing else fails.

Not only the stomach, but the whole intestinal canal, should be unloaded in the beginning of these fevers; but I am sure reason and experience shew the necessity of doing it by very gentle methods; clysters of milk, sugar, and salt, laxatives of manna, cream of tartar, *sal cathartic. glauberi*, tamarinds, and rhubarb, are what I would chiefly, if not only, advise. I have too often seen the very ill effects of acrid and stronger purgatives. *Hoffman cautions even against senna. The above soft easy emetics and eccoprotics, have this farther advantage, that they may be repeated, and given from time to time, as the putrid bilious *colluvies* drains into the first passages. By such means I never fear to puke, or promote a stool or two, when indicated at any time of the fever by a nauseous bitter taste in the mouth, sickness at stomach, nidorose and fœtid eructations, or by too great costiveness, tumid abdomen, borborygmi, griping pains, &c.

Though Hippocrates † advises in general against purging off the crude humours in the beginning of diseases before they are concocted; yet he allows we may purge in the beginning, when there is a turgescence of the humours, and they make an effort to be discharged. Thus a *cholera morbus* is an effort of nature to throw off a superabundant acrid bile. When putrid, malignant, autumnal fevers arise from a redundance of putrescent adust choler, as the ancients called it, in the region of the liver, stomach, &c. (which is very often the case after hot summers have greatly increased and exalted the bile, animal salts, and oils) we should certainly begin with such gentle emetics and cathartics as I have mentioned.

Unquestionably the bilious principle is too greatly predominant in all putrid, malignant, and petechial fevers. The gall-bladder and biliary ducts are always found full of black or green bile in those that die of pestilential diseases, and so is the stomach, *duodenum*, &c.* —Now if this putrid bile is not carried off, it grows more and more corrupt, and causes vast anxiety, sickness at stomach, &c. and being re-absorbed into the blood, creates infinite evils, greatly irritates the *genus nervosum*, destroys the crasis of the blood, and turns the lymph into a corrosive ichor. Where, therefore, there are signs of its being redundant, it should be forthwith discharged by vomit or stool, as nature points out. I have many times, with the greatest pleasure, in these putrid fevers, seen an amazing change for the better immediately succeed a fit of vomiting and a stool or two, where an inexpressible anxiety, load on the *præcordia*, perpetual sickness, eructation, and *singultus*, had preceded. The extreme foulness of the tongue, sickness, and load at stomach, with a loathsome bitter taste, and horribly offensive stinking breath and eructations, shew the condition of the stomach; and the abominably fœtid, black.

* De Febribus petechial. veris. Tom. IV.

† Aphor. 2. Sect. I. & Lib. de Humoribus.

* Traite de la peste, &c. Paris 1744. 4to.

black, bilious ſtools, the neceſſity and advantage of that diſcharge. Surely, if a poiſon of any kind was lodged in the ſtomach or bowels, we ſhould not heſitate about the neceſſity of carrying it off as ſoon as poſſible; and truly putrid bile is little leſs pernicious than actual poiſon. Commonly about the ſtate of theſe fevers, or between the ſeventh and fourteenth day, nature of her own accord endeavours to relieve herſelf from the putrid bilious *colluvies* by vomit, or looſe ſtools more frequently; and her regular operations ſhould always be favoured by art. And accordingly I generally give a gentle laxative the eighth or ninth day, unleſs I find ſome eruption appearing, or a kindly ſweat forbid it. Till this time, I ſeldom uſe any kind of purgative except a little manna, cream of tartar, or the like, at the very beginning (eſpecially when I have reaſon to think the diſeaſe ariſes more from contagion than a putrid *ſaburra*) ordering, however, an emollient laxative clyſter every ſecond or third day, as there may be occaſion.—This laxative I repeat from time to time as ſymptoms indicate, and during the operation carefully ſupport my patient with proper cordial diet, drink, and medicine. By theſe means I not only prevent the congeſtion and encreaſing corruption of this putrid bilious matter in the firſt paſſages, but alſo its reabſorption into the blood; and likewiſe ſollicit a farther diſcharge of the morbid humours into the inteſtinal canal, and thence out of the body. This gentle method of purging about this time, in theſe fevers, I have for many years found of very great advantage; but I proteſt againſt the aloetic, ſcammoniate, coloquintida purgers, which in ſuch a putrid, diſſolved, acrimonious ſtate of the blood are poiſons, not medicines: and whoever uſes them in ſuch a caſe, ſhould have the guts of his brain purged, if he hath any there. Nature, indeed, without ſuch powerful ſtimulants, too frequently over-acts her part, and runs into a profuſe diarrhœa, a dyſentery, ſoon fatal if not reſtrained. But this moſt commonly happens from ſuffering the corrupt bilious matter to lodge, and putrefy too long a time in the bowels; and the beſt way to prevent it is to diſſodge it, at proper ſeaſons and due intervals.

When we are threatened with ſuch an immoderate diſcharge, we muſt have recourſe to proper aſtringent alexipharmics, theriaca Andromachi, confect. fracaſtor. tincture of roſes, red-wine mulled up with cinnamon, &c. But above all, if the caſe be very urgent, to an aſtringent clyſter of confect. fracaſt. or theriaca Andromachi, with a ſmall quantity of decoction of tormentil, red roſes, or Japan earth. But no ſmall degree of prudence is neceſſary in the uſe of it; for it is always of dangerous conſequence to ſuppreſs a critical diarrhœa prematurely; and I think it ſhould never be done without premiſing a ſmall doſe or two of rhubarb. Before I conclude this paragraph, I cannot but take notice, that though I have very often ſeen a diarrhœa critical and ſalutary at the ſtate or decline of theſe fevers, I generally find it prejudicial at the very beginning; eſpecially if very thin, ſerous, and profuſe. Nothing more certainly ſhews a diarrhœa to be uſeful, than when a gentle breathing ſweat, or warm moiſture of the ſkin, accompanies it.

Though nature very frequently affects to diſcharge the morbific matter in putrid malignant fevers by vomit and ſtool, yet her more conſtant and grand effort is through the pores of the ſkin. I ſolemnly aſſert, I never ſaw one of theſe fevers completely judged, or carried off, till more or leſs of a ſweat iſſued. If it proves moderate, warm, and equally diffuſed over the whole body, ſuch as we call a breathing ſweat; if it comes on about the ſtate of the diſeaſe, and the pulſe grows more open, ſoft, and calm a little before, and during its continuance, it is always ſalutary.

But

but if very profuse, cold, clammy, or partial, about the head and breast only, we have much more reason to fear than to hope from it. If profuse sweats break forth at the beginning, they are generally pernicious; especially if a rigor supervenes.

But as these sweats are always most favourable when they are more the work of nature than art, they should never be too soon or too forcibly driven out by violent hot medicines, regimen, &c.; it is sufficient to promote and support them by plentiful subacid diluents, and gentle cordial diaphoretics, such as may dilute and wash off the salts, contemperate the acrimony, and prevent the farther encrease of the putrescence and dissolution of the blood, and preserve and strengthen the tone of the solids.

But as persons of very different constitutions, both as to their solids and fluids, may be attacked by contagious diseases, very different methods of cure will be necessary in their respective cases: those of strong fibres and a rich dense blood, do not require such warm medicines as are necessary to support the feeble and phlegmatic. It should be observed in general, however, that as the blood and humours in pestilential and petechial fevers tend to dissolution, stagnation, and putrefaction, such methods as will preserve the contractile force of the vessels, and prevent the advance of putrefaction, are necessary: the vegetable, and even properly prepared mineral acids, are highly serviceable in the latter intention; and the subastringent alexipharmics are very useful in the former. But I am very certain that the use of volatile alcalious salts and spirits is very hurtful; as they, without all doubt, augment the putrescent state of the humours; and act as so many spurrers on to swifter destruction: a very large use of them, without the aid of contagion, being found to bring on a corruption and dissolution of the blood, and such kind of fevers, even in the most healthy. Perhaps the pestilential miasmata themselves are only highly volatilized and subtilized animal salts: the generation of pestilential fevers, by the putrid exhalations of dead bodies after battles, sieges, &c. seem to shew this.

What I have said of volatile alcalious salts, leads me to a reflection on the promiscuous use of blisters in these fevers; which, by some, are deemed the only anchor of hope in such dangerous cases: but I think they are many times too hastily and improperly applied, especially in the beginning, when the fever runs high, and doth not demand a farther stimulant; for the action of the cantharides is not merely on the skin, but affects the whole nervous and vascular system: now when the irritations and vibrations are already too great, as frequently happens in the beginning of such fevers, they are very injudiciously applied: Besides, the salts of these flies operate much in the same manner as the volatile alcali salts, and certainly tend to promote the dissolution, and consequently putrefaction, of the blood. It is true, indeed, nature may sometimes want a spur, nay, often doth so, particularly towards the decline of these fevers, when the solids grow torpid, the circulation languid, the spirits effœte, and the sick comatose: here blisters must be applied, and are of exceeding great use, at whatever time of the fever such a train of symtoms comes on. But, in the above circumstances, I have very many times seen very pernicious effects attend their too early application; as obstinate pervigilium, delirium, suppression of urine, tremors, subsultus, &c. I would therefore advise the young practitioners, before they deal largely in these wholesome severities, to consult *Baglivi de usu & abusu vesicantium*; and they will understand him much the better, if they previously read his treatise *de Fibra Motrice*, & *Bellini de Stimulus*. Let me farther add, that where several blisters are laid on in any acute case, the patient should

ſhould drink freely of whey, emulſion, or ſome other ſubacid and demulcent liquor, otherwiſe he may ſuffer almoſt as much from the remedy as from the diſeaſe.

It may be expected I ſhould mention camphor as the grand corrector of the acrimony of cantharides; and in this view I frequently uſe it, well knowing that nothing more effectually blunts the ſpicula of ſalts than this exceeding fine, volatile, vegetable ſulphur; even thoſe of mercurial preparations are greatly ſoftened by it. But I think, in theſe putrid peſtilential fevers, it anſwers a much more important end by promoting a diaphoreſis, or eaſy ſweat, which is univerſally allowed, in ſuch caſes, of the higheſt ſervice; but nothing more certainly doth this than camphor, with this farther advantage, that it by no means heats ſo much as volatile alcalious ſalts, and ardent ſpirits. Beſides, its anodyne demulcent quality makes it vaſtly ſerviceable in quieting the erethiſm, and bringing on compoſure of ſpirits and eaſy ſleep, when opiates fail, nay, augment the tumult and hurry. Indeed, when joined with an opiate, it is the moſt certain ſudorific in nature; and the elixir aſthmaticum, or paregoricum, is not only in this reſpect, but in many others, a moſt noble medicine. But whenever opiates are given in theſe fevers, they ſhould be only in ſmall quantities at a doſe, which may be repeated, as indicated; theriaca Andromachi, Mithridate, diaſcordium, and elixir paregoricum, are, without all doubt, much the beſt. Camphor, however, hath this fault, that it is very diſagreeable to the ſtomach; but when diſſolved in (or rather intimately mixed with) hot vinegar, after the manner of the julep, e camphora, it ſits much eaſier, and is a medicine excellently well adapted to putrid malignant fevers, and even the plague itſelf: for both camphor and vinegar are highly recommended, by almoſt all phyſicians, in peſtilential diſeaſes. The French phyſicians made great uſe of both, with ſucceſs, in the late plague of Marſeilles, &c. and Heiniſius * had a ſtatue erected to his memory for the ſervice he did in the plague at Verona, by a medicine, the baſis of which was camphor.

Now, as we are obliged to give acids and ſubaſtringents in putrid malignant and petechial fevers, to preſerve the craſis of the blood and the tone of the veſſels, and prevent the farther putreſcence of the humours, diaphoretics (the chief of which is camphor) ſhould be joined with them, to keep up a free perſpiration, or gentle ſweat, which the former are apt to retard: this is quite conformable to the practice of the ancients, who mixed aſtringents with alexipharmics in the compoſition of their antidota, as may be ſeen in theriaca Andromachi, Mithridate, &c.—I am perſuaded they are better for it.—Theſe have ſtood the teſt of ages, and are unqueſtionably excellent medicines (when well uſed) though there may be ſeveral things in them trifling both as to quantity and quality. I very well know alum and nutmeg may be given with advantage in other fevers beſides intermittents, eſpecially when a little camphor and ſaffron are joined with them.

Here I beg leave to inſert the following preparation of the bark, which I have uſed for many years with ſucceſs, not only in intermitting and ſlow nervous fevers, but alſo in the putrid, peſtilential, and petechial, eſpecially in the decline; and that too, many times, though the remiſſions have been very obſcure, and yet with a very good effect. But, if the patient is coſtive, or hath a tenſe and turgid abdomen, I always premiſe a doſe of rhubarb, manna, or the like.

℞ *Cort. Peruv. opt. pulv.* ℥ii.—
Flaved. Aurant. Hiſpal. ℥iſs. —
Rad. Serpent. Virgin. ʒiii. —
Croc. Anglic. ℈iv. — *Coccinel.*
℈ii — *Sp. Vini Gallici* ℥xx. —
f. Infuſio

* Vid. Etmuller. de Peſte, Tom. i. p. 263. edit. Francofurt. 1688. fol.

f. Infusio clausa per dies aliquot (tres saltem quatuorve) deinde coletur.

Of this I give from ʒi to ℥ss every fourth, sixth, or eighth hour, with ten, fifteen, or twenty drops of elixir vitrioli out of any appropriate draught or diluted wine. This I order to be kept, in these parts, as an officinal medicine; and as a very useful one I recommend it to the trial of others. I very well know it will sometimes succeed in intermittents, when the bark in substance or decoction will not easily sit with the patients: and this is often an advantage of medicines given in a liquid form, which in a solid one proved disagreeable; and therefore where it can be conveniently and effectually done, it should be complied with. The above composition tends to strengthen the solids, to prevent the farther dissolution and corruption of the blood, and in the event to restore its crasis: and this it doth without shutting up the pores of the skin too much, which the bark in substance too frequently doth.—For it should be noted, that though very profuse sweats in these (and all other fevers, I think) are prejudicial; yet gentle, easy, moderate sweats, are always to be encouraged, particularly at the state, and in the decline, by proper plentiful diluents, liquid aliment, &c. Indeed, as these fevers very often run out to a great length of time, supporting drinks and diet are necessary, without which the patients certainly sink under them. In this view, and in those above-mentioned, I cannot but recommend a generous red-wine, as a most noble, natural, subastringent cordial, and perhaps art can scarce supply a better. Of this I am confident, that sometimes at the state, and more frequently at the decline, of putrid malignant fevers, it is of the highest service; especially when acidulated with juice of Seville orange or lemon. It may be also impregnated with some aromatics, as cinnamon, Seville orange rind, red roses, or the like, as may be indicated, and a few drops of elixir vitrioli may be added. I will not say, in the rant of Asclepiades, * *Utilitatem vini æquari vix deorum potentia*; but it is undoubtedly of admirable use not only in common life, but as a medicine.—Rhenish and French white-wines, diluted, make a most salutary drink in several kinds of fevers, and generous cyder is little inferior to either.—And, as I said above, sound, old, red-wine is a fine subastringent cordial julep. The Asiatics, and other nations where pestilential disorders are more rife than with us, lay more stress on the juice of lemons in these fevers than on the most celebrated alexipharmic. It is not as to these only, but in many other things that we seek from art, what all-bountiful nature most readily and as effectually offers us, had we diligence and sagacity enough to observe and make use of them. And I cannot but here take notice, that I think the dietetic part of medicines is not so much studied as it deserves. I am sure it is the natural way of cure, though less pompous indeed than alexipharmic bolus, febrifuge draught, and cordial julep.

As I think the following dissertations will more fully illustrate and confirm the preceding doctrine, I shall here subjoin them.

* Plinii Histor. natural. ex Edit. Harduin. Paris. 1723, Folio, Tom. II. p. 301.

AN ESSAY ON THE SMALL-POX.

THE different effects of the ſame diſeaſe, on different conſtitutions of the ſolids and fluids, is in no caſe more evident than in the ſmall-pox: for, firſt, when the variolous contagion attacks a perſon of ſtrong tenſe fibres, and a rich denſe blood, commonly a ſmart inflammatory fever enſues; in which ſometimes the lungs, ſometimes the brain, the throat, and other parts, are greatly inflamed, and on bleeding you have a very thick inflammatory blood; and you are many times obliged to bleed repeatedly, unleſs you will ſuffer your patient to be carried off by a raving phrenzy, or choaked by a peripneumonic inflammation. Here the pulſe is rapid, full, tenſe; the breathing hot, ſhort, and laborious; the heat very ſharp, and the urine high-coloured; the thirſt great; the tongue dry and foul; the pain of the head, back, loins, and limbs, exceedingly acute. Under ſuch ſymptoms I would bleed in a peſtilence, or indeed any other diſorder whatſoever, or elſe the utmoſt danger will ariſe from the inflammatory diatheſis of the blood, abſtracted from the contagion.

But I can by no means approve of the promiſcuous uſe of bleeding, ſo commonly practiſed in the ſmall-pox; for, 2dly, that diſeaſe many times comes on with the uſual ſymptoms of a ſlow nervous fever, and the ſick are frequently a long time drooping, as the vulgar call it; the fever low, the ſpirits ſunk, the pulſe weak, quick, and fluttering, the countenance pale and fallen, the urine crude and thin; no great thirſt, no great heat, a continual giddineſs and heavineſs of the head, with tremblings, a perpetual nauſea and puking, univerſal uneaſineſs, weakneſs, wearineſs, &c. I have ſeveral times known ſymptoms of this kind continue for ſeven or eight days together, and at laſt end in the ſmall-pox; which almoſt always proved of a very bad ſort, pale, crude, pitted, and ſeſſile, never riſing well, or maturating kindly, but continuing flat and flaccid, or running together in large watery bliſters, full of thin undigeſted ichor, and ſo remaining to the very laſt; whilſt in the face, from a deadly pale cadaverous hue, they turned to a ghaſtly black and very adheſive cruſt, if the patient ſurvived long enough, and even then generally proved fatal.

3dly, Sometimes the ſmall-pox are attended with a fever of the malignant or petechial kind, in which the craſis of the blood becomes quite diſſolved, black and livid ſpots appear, hæmorrhages enſue, and the puſtules turn black, gangrenous, and often bloody ſoon after the eruption, and that too ſometimes when the pox are very few and diſtinct. Here then we find three different kinds of fevers produced by one ſpecies of contagion, and we are obliged in the method of

cure

cure to have a regard to the particular fever, as well as to the peculiar nature of the contagious disease.

By this we see how absurd the general notion of either the hot or cold regimen is in all kinds of the small-pox indifferently. Sometimes Sydenham's method may be proper, sometimes Morton's. In a word, the particular case requires a particular method, and the attending physician is to shew his judgement in adapting it rightly.

Though the contagion of the small-pox produces the same specific disease, yet the degrees of that disease are vastly different. Even the very same contagion, in the same house, family, or village, frequently produces very different kinds of pox; some exceedingly mild and distinct, some highly malignant and dangerous. We see innumerable instances where the first seized shall have a very favourable kind, the subsequent a confluent, malign, and fatal. This is every day's experience; and yet amidst all this, and from the very worst sort, intermediate instances happen of the most benign. So that it is quite demonstration, that the constitutions of the particular patients greatly diversify the succeeding disease. And it is so in all cases, for even a common scratch in one, rankles and proves a stubborn ulcer; in another a large lacerated wound heals up with little or no difficulty. A common phlegmon in one easily resolves, or suppurates kindly; in another it proves gangrenous, scirrhous, or cancerous.

The contagion of the small-pox doth not always bring on a fever, at least to any considerable degree, though it may the small-pox; for many children, and even grown persons, have had them in the natural way, in so mild a manner, that they have had no perceptible fever, nor scarce ailed any thing previous to, or during the course of them. The variolous pus oftentimes infects the skin of those that have had them already, producing a great number of pustules, altogether similar to those of the small-pox, of the same duration and manner in maturation, but without any fever. This is very common among those that attend and handle persons ill of that distemper, especially those who have fine and tender skins. Here the contagion affects the cutaneous glands, &c. only, and not the blood, which had such an alteration made in it by the former small-pox, as not to be susceptive of it ever after. There are some peculiar constitutions, that will never receive this disease; for several persons never have the small-pox, though frequently conversing with, and even attending people in them. I knew an old nurse, and one apothecary, who for many years attended persons (and a great number too) in the small-pox, and yet never had them. Nay, many that have industriously endeavoured to catch the infection, by frequenting the chambers of the sick, have done it without effect; and yet some of these very persons, some months or years after, have been seized with the small-pox. The variolous pus, in inoculation, will not infect every one; and it is well known the pus, even from the same person, produces very different numbers of small-pox in different persons, and very different degrees of fever. Upon the whole, then, it is evident that the previous state of the body, and disposition of the humours, greatly contribute to determine the quantity and quality of the small-pox. Not but that the contagious *miasmata* may be of a much more virulent and active nature at one time than another, or during one constitution of the air than another; and indeed we actually find that it is so. But even this may be very much owing to that peculiar state of the air, inducing such or such qualities into the solids and fluids, which render them liable to such and such peculiar fevers. For we find one

constitution

conſtitution of the atmoſphere diſpoſeth to inflammatory fevers, another to the ſlow nervous, remittents, intermittents, &c. and a third to the putrid, malignant, or petechial.—— Now where the contagion coincides and co-operates with ſuch or ſuch a conſtitution, it will be productive of ſuch or ſuch a kind of ſmall pox; or rather of ſuch or ſuch a kind of fever with the ſmall-pox. For ſurely we many times obſerve a very untoward fever to accompany the ſmall-pox, where very few, and very diſtinct, though of an ill kind. Indeed I think I have frequently obſerved the common epidemic fever manifeſtly concurring with the ſmall-pox, and that the variolous contagion only diverſified the diſeaſe; or rather the epidemic fever was coincident with the ſmall-pox on the ſame ſubject. This was the caſe very often in 1740, 1741, and 1745, when a violent epidemic fever, of the peſtilential kind, raged here, chiefly among the ſailors, ſoldiers and priſoners (eſpecially in the laſt of thoſe years) who had commonly the moſt evident ſymptoms of the malignant fever with the ſmall-pox, which therefore proved exceedingly fatal among them; whereas many perſons in the neighbourhood, that had no communication with the hoſpitals, and were otherwiſe tolerably healthy, had a very favourable kind. And probably this malignant fever was chiefly owing to the high ſcorbutic ill habit of body, manner of life, confinement, &c. to which the above ſet of people were ſubject. Though I think the fever * in 1740, was from another original.

It ſhould ſeem then, could we preſerve, or produce, a certain peculiar diſpoſition of the blood and humours, we might elude the force of the infection. And this indeed is talked of by ſome, but I think upon a very ſlight foundation. Some particular preparations of the bark and mercurials, by way of antidote, have been thought ſucceſsful, and I have known ſome inſtances that inclined me to think ſo; but I am far from being ſatisfied ſo far as to adviſe, or depend on them.

In truth, in different conſtitutions, the very ſame medicine ſhall have very different effects; and it would be madneſs to give the bark and cordial corroborants to one of very ſtrong rigid fibres, and a very denſe viſcid blood, by way of prophylactic, or preparative; though they might be of much ſervice in a weak lax ſtate of veſſels, and a poor watery blood.— Would mercurials be proper in a too looſely cohering diſſolving ſtate of the blood? Verily ſome bad effects have been ſometimes noted on the uſe of them, particularly petechiæ, hæmorrhages, and profuſe diarrhœas in the enſuing pox, though I am ſenſible, in other circumſtances, they may be very uſeful. In ſum, then, whatever can be done rationally in this way, muſt be with a view to mend what is faulty, or ſupply what is defective, in the conſtitution; ſo as either to fortify it againſt the attack of the diſeaſe, or to prepare it the better to cope with it, when it actually ſeizes. Perhaps theſe few hints may not be altogether unworthy the conſideration of thoſe eſpecially, who have the preparation and management of perſons to be inoculated.

I am perſuaded, if perſons, regularly prepared, were to receive the variolous contagion in the natural way, far the greater part would have them in a mild manner; for undoubtedly a very bad ſort of ſmall-pox many times ariſes from an over-fulneſs of blood, acrimony of homour, or great loads of foul matter in the firſt paſſages; and very frequently errors are committed in diet, exerciſe, &c. after the infection is firſt taken, which often prove of fatal conſequence in the event. From theſe, thoſe that are inoculated are and ſhould be guarded, and hence the great ſucceſs of that operation.

* Vid. hujus hiſtoriam, Obſ. noſtr. de Aere, &c. Vol. II. menſe Junio 1740.

operation. Not but that the mild kind, from whence the variolous pus is taken, and the very small quantity of infectious matter received by insition, in part also contributes to the mildness of the disease. This, perhaps, is the whole of inoculation, if you take in likewise this consideration, that it is practised chiefly on the young, fearless, and most healthy.—Innumerable instances, however, have now sufficiently evinced the great success and advantage of this method; and, granting all that prejudice and party have said against it, the danger in the natural way is at least ten to one of what it is in this.

A particular regard then must be had to the constitution of the patient, and the constitution of the air, if we would practise with reason and success in the small-pox, and indeed in all other epidemic disorders.

For, first, the robust and vigorous constitutions have more viscid and dense humours, and much more of the red, globular, compact blood, and of course are liable to a higher fever, and greater inflammation, than persons of lax fibres, and a poor watery blood; and for this reason can bear better, in all cases, evacuations, especially by bleeding.

In the former then it is prudent, on the attack of the small-pox, to draw off some blood, and if symptoms run high, to repeat it. A full, tense, throbbing pulse, great heat, a difficult and hot respiration, high colour of the face, redness of eyes, phrenzy, &c. particularly demand it. An acute pain of the head, inflammation of the eyes, and throbbing of the carotid and temporal arteries, denote an inflammation of the brain, or its meninges, which you can never be too earnest and early in endeavouring to remove. After having drawn a proper quantity of blood from the arm, bleeding in the foot hath generally an admirably good effect.

Bleeding in such cases doth not retard the eruption, at least not beyond its due time. Where the blood and spirits are under a vast agitation, and the circulation excessively rapid, nature is so much embarrassed, as to be unable to make a regular expulsion of the morbific matter, much less to concoct it, or even to perform the common natural secretions. In common ardent and inflammatory fevers, you are many times obliged to bleed once and again, before you can procure the least sweat. Besides, some degree of coction is necessary in all critical eruptions, at least in such as prove salutary; and therefore you have generally more or less of a sediment in the urine just before, or at the eruption, and the fever subsides.—Where all is in a hurry, and the pox are pushed out too soon, frequently even within thirty hours, the fever continues, and the event is almost always fatal. Nor will bleeding, under the above circumstances, weaken the powers of nature; but by calming the over-violent motion of the vital fluid, and causing a more regular secretion of the animal spirits, it will relieve, nay, support her in her work.

Bleeding in the foot is known to make a very powerful revolution from the head and breast, parts we should endeavour to guard, as much as possible, against the violence of this disease. And to this end, I would recommend also bathing the feet and legs in warm water, or milk and water, for a few minutes, two or three times a day, before, and at the eruption; and would likewise have cataplasms of milk and bread, boiled turnips, or the like, applied to the feet. This practice I have for many years used with success, and particularly recommended in a short account of an anomalous small-pox, that raged here in 1724 and 1725.* This draws the blood in greater quantities to the lower parts, and of course relieves the head and breast; and as it brings down more blood, it brings down also more of the variolous matter to those parts, and, what is more, facilitates

* Philosoph. Transact. No. 390.

litates its eruption on them, which leſſens the quantity that might otherwiſe break out about the head, &c. At the ſame time the relaxing quality of the tepid bath tends to calm the impetuoſity of the blood, and in ſome meaſure alſo dilutes it. It is certain, where this method is uſed, a vaſt many pox break out on the legs and feet, and ſometimes, on the application of the cataplaſms, very ſevere pains affect them. It is the number of puſtules about the head, throat and breaſt, that are ſo juſtly to be feared. A common eryſipelas of the face and head, is vaſtly more dangerous than on the inferior limbs. The head, therefore, ſhould never be kept too hot, but ſhould be ſhaved antecedent to the eruption, eſpecially where there is much hair; this not only keeps the head much cooler, and leſs liable to be over-run with puſtules, but likewiſe prevents many troubleſome accidents in the courſe of the diſeaſe.

If, notwithſtanding the fever continues to run high, the eruption doth not regularly advance, I would not only adviſe bathing the legs and feet, but the arms and hands; nay, and even the trunk of the body alſo.—This I have had occaſion to practiſe more than once in ſome children, who, from being uſed to the cold for ricketty diſorders, had their ſkin rendered more denſe and hard than natural, which probably retarded the eruption beyond the due ſeaſon. In one of theſe (now a ſtrong luſty gentleman) the pox did not appear till the ſixth day, though he had a very ſmart fever from the beginning; and then, on bathing him up to the breaſt in warm milk and water, the pox came out forthwith very kindly, though pretty numerous. Bathing the body in this manner not only tends to relieve the head and breaſt, but it alſo draws out the morbific matter, and promotes its eruption on the external habit, by which the internal and more vital parts are leſs liable to the ravage of the diſeaſe. It is too often found that the variolous puſtules on the lungs, viſcera of the abdomen, &c. produce mortal effects.—This is not altogether a new method; for Rhazes * adviſes the patient to be kept in a kind of *balneum vaporis*, to facilitate the eruption.

Many times the ſtrong and plethoric fall into a vaſt dejection of ſpirits, and a general debility, attended with a heavy oppreſſed pulſe, at the very ſeizure with the ſmall-pox, which makes the leſs experienced practitioner very diffident as to bleeding, though here equally neceſſary, and nothing ſooner relieves them, eſpecially when this, in great part, ariſes from fear and dread of the diſeaſe; which is very often the caſe with adult perſons, who, by the bye, can beſt bear bleeding, unleſs very old. For not only the contagion itſelf perhaps primarily affects the animal ſpirits, but the very fear and concern alſo ſo diſturb and weaken the powers of nature, that the heart and contractile veſſels exert much leſs force on the contained fluids, whence the regular ſecretions and excretions are conſiderably diminiſhed, particularly thoſe important ones, the nervous fluid and perſpiration. So that hence the *moles movenda* is encreaſed and the *vis motrix* leſſened. Drawing off part, therefore, of the encreaſed blood, under ſuch circumſtances, is in event equivalent to an encreaſe of the moving force. Beſides, when part of the viſcid humours is drawn off, the remaining are more eaſily attenuated, and rendered more fit to give off the actuating principles, or animal ſpirits, in due quantity. Some blood therefore, in ſuch caſes, ſhould be drawn as early as poſſible, but not in too large quantities at once. It is certainly better to repeat the bleeding, if neceſſary, at leaſt to ſtop the orifice now and then; for by this means you avoid the fainting, which otherwiſe frequently happens, unleſs the patient is bled in a recumbent, or lying poſture.

But farther, where immoderate fear

* Vid. Rhaz. de Variolis & Morbillis, Cap. vi. ex edit. Mead.

and

and dejection of ſpirits concur with the diſeaſe, there is really oftentimes a neceſſity of giving ſomething of a cordial nature, even at the very beginning, and that too ſometimes even not ſparingly. Now when the ſuperabundant quantity of the blood is drawn off, theſe invigorating medicines may be uſed with greater ſafety and advantage; and I have many times ſeen exceeding good effects from them, where the puſtules, through exceſſive fear, and oppreſſion of ſpirits of the patients, lay buried in the ſkin, as it were, and made no conſiderable advance for two or three days together. I am no great advocate for the hot regimen, eſpecially at the beginning of the ſmall-pox; but I know this muſt be done in ſuch caſes, bliſters muſt be applied to rouſe the ſluggiſh oſcillations of the veſſels, or the patient certainly ſinks under the malady. Yet in general I am not fond of bliſtering very early in the ſmall-pox, unleſs there is great reaſon to fear that the tongue, fauces, and narine paſſages, are otherwiſe like to be greatly infeſted with them. When the diſeaſe attacks with a rawneſs, ſoreneſs, or great heat of the mouth and throat, and a conſiderable ſharp rheum, or ſtoppage in the noſtrils with frequent ſneezing, and a tickling cough, this is to be expected, unleſs prevented by timely bliſtering, which I have often found very ſucceſsful.—A great ſneezing and ſharp rheum from the mouth and noſtrils, ſhew that the *membrana ſchneideriana*, the common lining to all theſe paſſages, is greatly affected, and that a revulſion from it is indicated; for even a few puſtules in the throat and noſtrils are of vaſtly worſe conſequence than an hundred times the number on the external habit. Great pain and difficulty of breathing and ſwallowing are the certain effects, eſpecially towards the cloſe of the diſeaſe, which frequently quite choak the ſick, unleſs you are exceeding diligent with your gargles, ſyringing, &c. Sometimes I have known ſuch a violent defluxion on theſe parts, as to cauſe a very profuſe ſalivation even at the very beginning, which hath kept the patient conſtantly awake, excoriated the tongue, lips, and throat, brought on ſuch exceſſive pain as utterly to deprive them of ſleep, and make ſwallowing any drink, aliment, &c. almoſt intolerable. Here early bliſtering in the neck, behind the ears, &c. is indiſpenſably neceſſary.

But ſecondly, when perſons of weak lax fibres, and a poor thin blood, or thoſe who have undergone lately great evacuations, are attacked with the ſmall-pox, withhold your lancet, as you tender the life of your patients. Theſe generally have a ſunk pale countenance, a weak, quick, trembling pulſe, very great dejection of ſpirits, with a pale, crude, weyiſh, or limpid urine, alternate chills and heats, little thirſt, and no great pain, but a perpetual heavineſs and ſickneſs at ſtomach, giddineſs, &c. Here, I pronounce it, ſack and ſaffron are not improper, with more caſy, cordial, nervous medicines, ſack whey, wine and water, or the like. But all this may be done without large doſes of volatile alcalious ſalts and ſpirits, ſnake-root, brandy, ſtrong wine, &c. And yet I have ſeen pretty large quantities of wine given in ſome low depreſſed caſes, with very great advantage. Bliſters alſo may be here applied, and ſtimulating cataplaſms to the feet. Bathing ſeems not ſo proper.

There is one thing in a peculiar manner that greatly promotes the variolous eruption in theſe low ſlow caſes, where the puſtules do not break forth in a regular manner at the uſual ſeaſon, but lie buried in the ſkin with little or no protuberance, and leſs colour; and that is vomiting by a gentle emetic. Nature almoſt always makes this effort ſpontaneouſly in this diſeaſe, and I think we ſhould follow the indication; for it not only in part throws off the morbific matter which prima-

rily affected the ſtomach, but alſo the heavy, putrid, bilious colluvies, that may have been collected in it, the liver, gall-bladder, &c. It is very notorious that the action of vomiting forces off through the ſkin, perſpiration, ſweat, puſtules.—I know it is objected, that vomiting drives up too much blood to the brain, and therefore is improper in the beginning of the ſmall-pox: and I think ſo too, if done antecedent to bleeding in plethoric conſtitutions. Nay, I have known very terrible accidents enſue, where thus injudiouſly managed. But let it be conſidered, that without the ſollicitation of art, nature is always at it, and makes almoſt perpetual, though many times vain, endeavours to diſcharge the ſtomach. Now it is certain, that by co-operating with her motions, and aſſiſting her effort with a proper waſh, we greatly help her attempt, and the vomiting even ceaſes much the ſooner; and it is obſervable, that, on the complete eruption, the vomiting goes quite off; but even that is by this means very much promoted. I would have the cataplaſms to the feet immediately ſucceed the emetic, for reaſons that are very obvious.

The emetic hath commonly the farther good effect of producing a ſtool or two, by which the inteſtines are unloaded of groſs indurated excrements, or any putrid bilious contents. If this doth not happen, an emolient laxative clyſter ſhould be forthwith given; and, in many caſes, a gentle, eaſy, cool cathartic of manna, cream of tartar, Glauber's ſalt, or rhubarb, is neceſſary; even if a diarrhœa is urgent, a doſe or two of rhubarb ſhould be given.

Different conſtitutions of the air have different effects on the moſt healthy, much more on the ſick and weak, and of courſe on diſeaſes.—It hath been long obſerved, that one conſtitution of the atmoſphere promotes, another retards, the progreſs of epidemic diſorders, particularly of the ſmall-pox, which at one time begin in the remoteſt corner of a town or city, and ſoon ravage the whole; at another they are carried into the very heart of them, and yet preſently ceaſe. The plague itſelf is commonly ſtopped by a change of air from hot and moiſt to cold and dry. The very ſtate of the blood greatly depends on the precedent and preſent conſtitution of the air, and it hath been proved, that the contagion hath different effects on different ſtates of the blood. A due conſideration, therefore, of the preſent and preceding conſtitution of the air, is of no ſmall import to our method of cure.

As a continual cold dry air makes the fibres ſtrong and very elaſtic, and the blood denſe and viſcid, one may reaſonably conclude, that patients, in ſuch a conſtitution, will, *cæteris paribus*, more need and better bear blood-letting, than in a warm, moiſt, relaxing ſtate of the air; and that they will want more of the diluting, emollient, antiphlogiſtic drink, diet, and medicines. Whereas, in the latter, ſomething more cordial, ſubaſtringent, and antiputreſcent, will be requiſite.

It is certain, in very cold and dry weather, as alſo when very hot and dry, perſons in the ſmall-pox ſpit vaſtly leſs than in the oppoſite conſtitutions of the air; ſo that, in a very dry atmoſphere, all proper means ſhould be uſed to dilute the humours, and promote ſalivation, ſo neceſſary and ſalutary in this diſeaſe. This however, in ſome ſeaſons and ſome perſons, is vaſtly too profuſe and prejudicial; I think more particularly in coldiſh, moiſt, ſlabby weather, and in perſons ſubject to catarrhal diſorders. I have many times known the ſalivation begin ſo ſoon, and continue ſo immoderate, as at length to abrade the common envelope of the tongue, mouth, and fauces, cauſing moſt exquiſite pain, preventing ſleep and ſwallowing, and keeping the patients in a perpetual torture. And therefore I always dread a premature ſalivation, eſpecially when profuſe and very acrid.

As

As ſome conſtitutions of the air hinder a ſufficient ſalivation, others diſpoſe to too much, and that too acrimonious: an epidemic catarrh ſhall at one time be only a diſcharge of a thin, ſoft, inſipid mucus; at another, a profuſe acrid gleet, excoriating the noſe, lips, fauces, &c. Probably ſuch a kind of atmoſphere as diſpoſes to exceſſive ſalivations, may in part alſo be productive of that crude, cryſtalline, undigeſted pox, which we too frequently meet with. For a moiſt, flabby, chill ſeaſon, not only too much relaxes the contractile veſſels, and impregnates the blood with the cold nitrous vapours, but withal greatly obſtructs perſpiration; whence a ſharp ſerous colluvies is accumulated; and it is chiefly in ſuch ſeaſons that this ſort of ſmall-pox is predominant; as the ſmall, warty, black kind, with little or no ſalivation, is moſt commonly obſerved during a long-continued courſe of dry north-eaſterly winds, very hot or very cold dry weather. Doth not this obſervation hint to us the different regimen neceſſary in different ſeaſons?

Theſe cryſtalline or lymphatic pox never maturate kindly, but the matter remains crude, and a mere watery ichor to the laſt; and in many places they run one into another, and form very large veſications, which at length breaking and corroding all around them, the patient is ulcerated all over, and appears like a flead rabbit. I have ſeen ſome running down under ſuch a kind of a tabes for twenty or thirty days together, the ſharp humours oozing out, and dripping from them continually, till at laſt they have been diſſolved in a double ſenſe. Very frequently a great part of this thin crude matter is re-abſorbed into the blood, and leaves a vaſt number of the puſtules flaccid, empty, or ſiliquoſe, as they call it. This creates terrible diſorders, and plays over the tragedy again, which generally ends in a fatal cataſtrophe; convulſive rigors, peripneumonic fever, delirium, dyſentery, ſyncope, &c. are the common conſequences. However, when it goes off by a moderate diarrhœa, or a very plentiful diſcharge of full-coloured ſubſiding urine, the ſick very often recover; but when the ſtools are black, bloody, or ſanious, they generally indicate a mortification of the inteſtines, eſpecially if the abdomen is ſwoln, painful, and tenſe. And a micturition, or perpetual urging to urine without any conſiderable diſcharge, is a very bad ſymptom, unleſs it ariſes from bliſters.—If ever large ſweats are uſeful in the ſmall-pox, it is in this kind of them; and I think I have found them ſeveral times greatly advantageous.

In this crude, ichoroſe, indigeſtible pox and profuſe ptyaliſm, where the ſkin and puſtules are pale or lurid, the pulſe weak, the urine thin, watery, crude, the warmer medicines are neceſſary; ſuch as pulv. contrayerv. c. myrrh, muſk, ſaffron, camphor, theriaca, mithridate, confectio cardiaca. Theſe are of vaſt ſervice in raiſing the puſtules and digeſting the matter, and may be waſhed down with ſack-whey, decoct. rubicund. a temperate teſtaceous julep, or a diſh of coffee now and then, with a little thin milk in it; which I have known, more than once, drank through the whole courſe of the ſmall-pox with no ill effect, nay, with a very good one; as it manifeſtly quieted the tickling vexatious cough cauſed by the ſharp thin rheum.

Here alſo, without doubt, opiates are ſtrongly indicated, and theriaca, elixir paregoricum, or tinctura thebaica, ſhould be given with diacodium frequently, but in ſuch doſes as to quiet, not to ſtupefy, the patient; which indeed is the moſt ſafe method of giving opiates in all ſorts of fevers, and ultimately the moſt effectual; for though a large doſe at once may more immediately procure ſleep, yet it is much leſs refreſhing; but, when it doth not, a delirium is almoſt always the certain conſequence, or a long continued ſtupor. In all events,

great doſes cauſe very great relaxation and univerſal debility, which nothing but a freſh doſe, after ſome time, or a warm cordial, will relieve: they are ſimilar in effect to large doſes of ſpirituous liquors, which produce temporary madneſs or ſtupefaction, ending in general weakneſs, tremors, and the utmoſt dejection of ſpirits. Beſides, no one can ſay what effect a particular doſe of opium will have on a particular perſon, till he hath tried it. Some have ſuch a peculiar diſpoſition, that a very ſmall doſe will greatly affect them; whereas others, of nearly the ſame apparent ſtrength, conſtitution, &c. will take four times the quantity with vaſtly leſs effect.—Some bear diacodium that cannot touch opium. So that it is always prudent to begin at leaſt with moderate opiates, and in ſmall doſes.

Yet notwithſtanding this caution, there are no medicines whatever that incraſſate thin acrid humours, abate their irritation and defluxion, and mature the puſtules ſo effectually, as opiates properly given. In truth, when the puſtules are numerous, we can do very little without them, eſpecially towards the ſtate of the diſeaſe, when they become exceedingly painful.—And yet even here, when the ſalivation is extremely viſcid and difficult, and the reſpiration ſhort and laborious, we ſhould be very cautious in uſing them, and join with them gum ammoniac, oxymel ſcilliticum, &c.

Nor muſt we, in this lymphatic or cryſtalline pox, be ſparing of bliſters, which, beſides their other good effects, give a copious vent to the acrid morbific humours; and for the ſame reaſon, the large bladders, which the puſtules cauſe by running together, ſhould be opened with a lancet,—Letting out the matter with a golden needle, as * Avicenna adviſes, is more nice than neceſſary. Do it as you will, a worſe cicatrix follows than when committed to nature. But here the danger ſuperſedes that conſideration, for a mortification it ſometimes brought on by the corroſive matter, and ſome of it withal is continually re-abſorbed into the blood.

I would alſo adviſe ſome proper diuretics to be joined with the alexipharmac medicines, as nitre, ſal ſuccini, ſpirit nitri dulcis, and the like. For I have many times obſerved a plentiful flow of urine very happily compenſate the deficiency of other evacuations; and, if this happens when the ſalivation begins to ceaſe, and the face ſubſides, it is always ſalutary; and as it is ſo, it ſhould be promoted as much as poſſible; and the ſick ſhould be frequently prompted to diſcharge it, which is greatly facilitated by getting them upon their knees. For, whilſt lying in bed, they have many times neither inclination nor power to make it; and yet immediately on being lifted up, they ſhall render it in a large quantity.

Nothing is more common than for the thin, acrid, variolous matter, to take a turn down the inteſtines, and very often in a very violent manner. Innumerable inſtances have occurred in the ſmall-pox, where a critical diarrhœa hath ſaved the life of the patient; nature even ſubſtitutes this diſcharge in children, for the ſalivation in adults. We ſhould be very careful therefore, never to ſuppreſs it too haſtily; and even when it is profuſe, we ſhould not attempt it, till we have premiſed a doſe or two of rhubarb; and then, indeed, proper aſtringents, opiates, decoct. rubicund. decoct. fracaſt. tinct. roſ. &c. may be uſed; and when every thing elſe fails, a clyſter with diaſcordium, or theriaca, will ſtem the torrent. But in general we ſhould only moderate it, eſpecially at or after the ſtate, taking care, however, to ſupport the patient, during the flux, with a proper ſtrengthening ſubaſtringent diet.

I never obſerved either the vegetable or the mineral acids of any great ſervice

* Avicenna Canon Medic. Lib. iv. Cap. de Variolis, p. 66. ex edit. Plempii.

ſervice in the crude cryſtalline pox; but I have often found them highly uſeful in the ſmall, black, confluent kind, with petechiæ; in which the putrefaction of the humours in general ſeems much greater, and the matter of the puſtules is vaſtly more fœtid and ſanious, than in the cryſtalline, the ichor of which many times hath little or no ſtench at all.—Though perhaps ſcarce one in four recovers from this ſmall, black, confluent kind (and when attended with black ſpots, bloody urine, and other hæmorrhages, ſcarce one of a thouſand) yet ſometimes great things have been done by mineral acids, aſtringent alexipharmics, and preparations of the cortex peruv. when the petechiæ have been numerous, and the ſmall-pox very black, ſmall, and confluent, nay, and even attended with ſome degree of hæmorrhage. I have known ſome inſtances of a recovery, under theſe circumſtances, by thoſe methods; but never met with one who ſurvived the diſeaſe, that made bloody urine, unleſs it was manifeſtly from cantharides. But as this kind of pox is of very long duration, and the patient (if he at length gets over it) continues between life and death, as it were, for many days together; the above medicines are not only neceſſary, but he ſhould be alſo plentifully ſupported, in the laſt ſtadium eſpecially, with proper analeptic and antiſeptic drinks and diet; till at laſt, like the ſerpent, (emblem of recovered health) he crawls out of the black exuviæ into new life and vigour: and truly I have ſeen ſome caſes, which ſeemed more like a reſurrection than a recovery.

When I recommend the uſe of the bark in ſome kinds of the ſmall-pox, I do it upon ſufficient experience and authority; whoever is not ſatisfied with mine, may conſult the great Dr. Mead,* Prof. Monro,† and Dr. Wall,‡ on this matter.—I commonly begin with the alexipharmic tincture of the bark above deſcribed, well acidulated with elixir of vitriol; and then proceed to the decoction, or extract, if neceſſary. But let me ſtrongly caution againſt giving any thing of this kind, where the reſpiration is difficult, the body very coſtive, and the abdomen hard and tumid, at leaſt till you have removed thoſe ſymptoms.—I muſt add, that the tinct. cort. alexipharm. is particularly ſerviceable in the lymphatic pox, and ſhould be given ſoon after the complete eruption, to promote, as much as poſſible, ſome degree of maturation. It is certain bark commonly brings on a laudable digeſtion in gleety ulcers. Morton* gave the bark, not only in the decline, but during the maturation of the pox, if he found any remiſſion; and that too every third or fourth hour, to the quantity of a drachm; and I know this hath been practiſed many years ago, with ſucceſs, by ſome other eminent phyſicians.

The great difficulty and danger of this diſeaſe, chiefly comes on at the ſtate, or turn of the pox (which happens much ſooner in ſome kinds than in others, the milder the pox, always the ſooner) for however eaſily matters may have proceeded till this time, we are now (viz. the ſeventh, ninth, or eleventh day from the eruption) very often ſurpriſed with a very ſhocking change, and terrible ſymptoms. The ſwelling of the face ſinks at once, the ſalivation ſuddenly ceaſes, the puſtules grow flaccid, the interſtices pale, lurid, or aſh-coloured; a rigor comes on, a fever ſucceeds, with great difficulty of breathing, faintneſs and ſickneſs; a perpetual anxiety, tremors, ſubſultus, delirium, &c. ſoon follow. Such a change is to be expected, if the puſtules break out very numerous the firſt, ſecond, or third day from the ſeizure; if after the complete eruption they do not fill well, keep up round, and properly pointed, but grow flat, and run abroad, or have a ſmall dimple or black ſpeck in the middle; if they are not ſurrounded with a florid baſe,

* De Variolis & Morbillis, p. 45.
† Medical Eſſays, Vol. V. p. 102.
‡ Philoſoph. Tranſact. No. 486.

* De Variolis, cap. ix. p. 250.

and

and look themselves wan, or darkish coloured. If the urine withal hath continued, or grows pale, crude, and thin, and the carotid and temporal arteries throb much, no small danger is impending. Here, then, the physician must in a more especial manner watch his patient with the utmost diligence; for the affair of life and death is now to be transacted in a few hours: and though no absolute rules can be well laid down in a disease that is attended with such a great variety of accidents as the small-pox, yet perhaps the following hints may not be altogether useless.

1st, If the swelling of the hands doth not regularly succeed the tumor of the face, and the swelling of the feet that of the hands, it is justly reckoned an ill symptom; for this is a regular and critical translation of the morbid humours to those parts, and commonly happens when the salivation begins to abate, and the face subsides.

Where, therefore, circumstances are threatening, I would advise the application of epispastics to the wrists and ancles, a little before we should expect the tumour of the respective parts should come on; for these not only more certainly draw the humours there, but also give them vent: and I think the use of emollient cataplasms or fotus to the parts, should for some time precede the blisters, as they would also tend to follicit these critical tumors. Baglivi * says he ordered sponges soaked in emollient decoctions with great success. Sometimes indeed, nature, of her own accord, throws the morbid matter on the extremities with such violence, as to create great inflammation, tumor, and most exquisite pain, which nothing will so effectually relieve as emollient fomentations, by relaxing the parts, and opening the pores.

The foregoing method I recommended above twenty years ago †, and have since practised it in abundance of instances with great advantage.—The premature recession of critical tumors is always of very dangerous consequence, witness even the common gout; insomuch that we are many times obliged to fix it by acrid cataplasms. In the above case, blisters not only attract but discharge the morbific matter. I very frequently add cantharides to the cataplasms; and I find it now a practice with some very great physicians to apply blisters to the soles of the feet in cases of danger.

2dly, If heat, head-ach, sickness, and load at stomach, great restlessness, or stupor, come on about the sixth or eighth day from the eruption, the body being costive, as commonly it is, a plain clyster of milk, sugar, and salt, seldom fails of giving immediate relief: and this is especially necessary when the sick make frequent but vain efforts to stool. For the excrements, baked up by heat and long retention, are crowded into the *colon* and *rectum*, where pressing on the bottom of the aorta, iliacs, and neck of the bladder, they hinder the free descent of the blood to the lower parts, whence the head and breast are over-loaded. Besides, they suppress the urine, and neither wind, stool, nor water, can be discharged till the indurated excrements are softened, and the guts relaxed, lubricated, and irritated to their office by a proper clyster. Indeed I seldom suffer my patients, particularly young persons, to grow so exceeding costive; for I generally order an emolient clyster, if necessary, to be injected every second, third, or fourth day from the beginning, till I enter on the use of gentle purgatives, which keeps the patient much cooler, and renders the use of anodynes much more safe and effectual: for very often they will have little or no effect till the body is unloaded, or bring on a comatose disposition.

And yet, 3dly, Anodynes are almost always proper, nay necessary, in the small-pox, especially at and towards the crisis: were it for nothing but

* De variolis & morbilis.

† Philosoph. Transact. No. 390.

but to assuage the pain from an inflammation of the skin and pustules, they would be required; for if one boil is attended with so much uneasiness, what will ten thousand occasion? However, the pain and soreness complained of is generally a good symptom. It is certainly a very bad one when neither the skin or pustules enflame or grow painful; for it argues a great deficiency of *vis vitæ*, want of a due circulation in the extreme capillaries, and an universal torpor. Let me farther add, that towards the state especially, the opiates should be given early in the evening, before the exacerbation comes on, and in larger doses; and if need be, oftener repeated. Diacodium here seldom proves sufficient, unless in children. The dose of the anodyne particularly should be always encreased the evening before we expect the crisis, in order to quiet the tumult, which generally comes on the ensuing night; for, as Hippocrates * observes, the night before the crisis, in all fevers, is most troublesome. When the patient is very feverish and hot, I find it best to give the opiate with some acid, or out of a saline draught; but, when low and languid, with thearica, or some alexipharmic.

4thly, If at the approach of the secondary fever the pulse beats very quick, hard, and strong, the carotid arteries throb greatly, the heat grows intense, the breathing very difficult, and an acute pain of the head, or more or less of a phrensy, comes on, you are to bleed immediately, or in a very short time the case will be irrecoverable.—It is observable, that the blood drawn, under such circumstances, is extremely viscid, and as buffy as in the highest pleurisy: it is very evident that it is in a very inflammatory state, from the ophthalmies, quinsies, peripneumonies, rheumatisms, and external inflammations, which commonly succeed.

But, 5thly, If on the contrary the pulse flags, the patient faints, the pustules and the interstices grow pale, shrivelled, and sunk, or livid, the extremities coldish or clammy, you can scarce give too warm medicines, drinks, &c. nor apply too many blisters: I have seen very large quantities of warm wine given under such circumstances with surprising success.

6thly, About the close of the third stadium of the small-pox, the salivation commonly abates much, and the matter very often grows so exceeding thick and glutinous, that it is spit off with the utmost difficulty, and threatens suffocation every minute almost, unless perpetually deterged by proper gargles, syringing, &c. I know no gargles better in this case than cyder and honey, or vinegar, water, and honey, or oxymel scilliticum, with a little nitre or crude sal ammoniac. Mustard also may be boiled with advantage in the gargles, when a stronger stimulant is wanting. The vegetable acids are much more saponaceous and absterfive than spirit of vitriol, though more commonly used. Many times all these are ineffectual, and nothing but an actual vomit will relieve. Sydenham vomited in this case, with vinum benedictum to ℥iss. We have much milder, but equally efficacious; nay, oxymel scilliticum frequently given, many times succeeds, by gently puking, and easing both expectoration and respiration. Besides, it hath the farther advantage of promoting urine and stool, which are very often deficient at this time of the disease; but when the case is urgent, it should be quickened by a decoction, or infusion of ipecacoanha. I have had honesty and resolution enough to put this in practice several times, where this was the *derniere ressource*, and thereby have sometimes evidently snatched my patient from the jaws of death, though at the risque of my own reputation; but truly sometimes also I have lost both. But I shall ever be of Celsus's opinion, to try a doubtful remedy rather than none. It is not very uncommon to find the tongue and fauces covered

*Aphorism 13. sect. ii.

covered with a vaſtly thick, adheſive, whitiſh, or brown pellicle, ſo that they look as if they had been parboiled; and the œſophagus and aſpera arteria are commonly in the ſame condition: this neither vomit, gargle, nor aught elſe will remove; and is a very bad ſymptom, as it ſhews there is no manner of ſecretion through the glands of the parts.

The great tenacity of the mucus of the mouth, fauces, &c. many times ariſes from want of drinking freely, through the courſe of the diſtemper. But this is abſolutely neceſſary to dilute the blood, ſupport the ſalivation, fill the puſtules, waſh off the morbid acrid ſalts, and ſupply the veſſels with more wholeſome fluids; the very aliment in this diſeaſe ſhould be, nay, muſt be, chiefly liquid; as ſolids, for the moſt part, can be neither reliſhed nor ſwallowed. In the black confluent ſmall-pox, you muſt drink or die: thin acidulated whey, decoct. luſitan. gruel, or water with Rheniſh or ſmall French white-wine, cyder and water, or the like, are exceeding proper; and if either petechiæ or hæmorrhages appear, tincture of roſes, or claret and water well acidulated.

But, 7thly, When the incruſtation is perfectly formed, and the ſalivation abates, we muſt ſtudy to promote ſome other evacuations; for nothing now is to be farther thrown off on the external habit, little or nothing now can tranſpire through the crufty ſcaly ſkin, which envelopes the body like a coat of mail, or rather, in its conſequences, like the poiſoned ſhirt of Hercules: for it not only vaſtly hinders perſpiration, but alſo confines the pus and ſanies, which grow every hour more and more putrid, and, being continually reſorbed into the blood, bring on, feed, and augment, the ſecondary fever.

If we can keep up the ſalivation, and promote a due flow of well-concocted urine, at this period, things go on tolerably well; but, very often, they both greatly fail all on a ſudden, and the patient falls into the utmoſt danger. Here all endeavours ſhould be uſed to renew theſe evacuations; more bliſters ſhould be forthwith laid on, and an emollient laxative clyſter immediately injected: expectorating mixtures likewiſe of oxymel ſcilliticum, lac ammoniac, &c. ſhould be frequently uſed.

Moreover, it is of no ſmall advantage at this time of the diſeaſe, to ſhift the linen of the ſick, which is now grown exceeding foul, ſtiff, and ſtinking, and become vaſtly uneaſy to them: beſides, it very much pollutes the air of the chamber, and renders it ſo very unfit for reſpiration, that even the moſt healthy can ſcarce bear it; nay, it not only hurts the breathing, but the miaſmata of this poiſonous mephites are continually paſſing into the blood again through the vaſa inhalantia, lungs, &c. and farther corrupt the blood. It is ſurpriſing to find how greatly the ſick are refreſhed on changing the air of the room, by prudently opening the windows and doors, and removing the ſtinking linen, &c.: they have new life, as they frequently and properly expreſs it; for freſh air is the breath of life. It is certainly of the higheſt ill conſequence to confine ſuch putrid air, and the ſick in it. The abſurd method of making a kind of hoſpital chamber in a houſe, and crowding up two, three, or more ſick in it, is a moſt dangerous practice, and I have often known it manifeſtly fatal: the ſtench, the groans, the cries of one, diſturb and offend the others; it is rare that they ſleep all together, but they are too often kept waking ſo: it is bad living by ſuch bad neighbours. Whatever may be pretended, there is no manner of danger in ſhifting the ſick, provided it can be carefully done, into very dry warm linen; but it is a ſilly notion to have the ſhirt or ſhift wor'n by another perſon for twelve or twenty-four hours before it is put on the ſick perſon. Can it not be made fully dry and warm without ſo doing? Will not the perſpiration,

or

or ſweat, of the moſt healthy, dirt and damp it?

But of this enough: I return to the affair of evacuation, and ſhall conclude this head with ſome obſervations on purging in the ſecondary fever of the ſmall-pox.

When the ſalivation proceeds regularly, the puſtules keep up and maturate kindly, the ſwellings of the face, hands, and feet, come on in due ſeaſon, and the patients ſleep quietly, and breathe freely, all things are well, and natute is moſt effectually doing her own work, and ſhould be properly ſupported in it, but never diſturbed. Here I even abſtain from clyſters, though the patient may have been coſtive for ſeveral days together, till after the complete incruſtation; and then they are proper to prepare for the ſucceeding purges, which without all doubt are then neceſſary.

But it very often, nay, almoſt always, happens, in the coherent and confluent pox, at, or before, this period, that more or leſs of a ſecondary fever comes on; partly from the reſorption of the matter of the external and internal puſtules, partly from the ſuppreſſed perſpiration, and partly from the putrid colluvies of the inteſtinal canal: which cannot but be very conſiderable, as undoubtedly part of the morbific matter, ſeparated by the glands of the mouth, fauces, &c. is ſwallowed, and a great deal more muſt be ſecreted by the glands of the guts, biliary ducts, &c. into the inteſtines: for, as vaſtly leſs than uſual now paſſes off through the ſkin, a much greater quantity of humours muſt fall on the bowels; it being a well-known maxim, that the leſſening of one evacuation is the encreaſe of another, and alſo that there is a peculiar conſent between the ſkin and the guts: to all this likewiſe is added the purulent matter of the variolous puſtules, that may happen to be in the ſtomach and inteſtines. So that there cannot but be a great lodgment of very putrid matter in the firſt paſſages, which grows the more and more virulent the longer it continues there, and is perpetually paſſing over again into the blood, through the abſorbing veſſels of the guts, and becomes a fuel to the fever, which nature endeavours, even this way, partly at leaſt, to throw off. Should it remain there then, or ſhould it be carried off? The anſwer is obvious. Nature, of her own accord, commonly attempts it with the greateſt advantage in the adults, and almoſt always in children, to whom a diarrhœa is a kind of ſuccedaneum to the ſalivation of elder perſons. Is not this then a ſufficient indication how to relieve her at ſuch a juncture? And in truth, what horribly fœtid, putrid, large ſtools, do we obſerve in this diſtemper, on the uſe of a clyſter, and more eſpecially after a purgative, I mean at the ſtate, or in the declination? Nay, this maſs of corruption lying long in the guts, and growing daily more putrid, becomes at laſt ſo extremely acrid as to corrode them; at leaſt ſo greatly irritates them, as to bring on that very diarrhœa, or dyſentery, which ſome ſo vainly fear will ariſe from a gentle cathartic.

But farther, if nature, neither by her own effort, nor the help of art, is capable of keeping the morbific humours from falling on the more vital parts, but, from an unfortunate tranſlation of it, is like to ſink under its weight (as upon a ſudden retroceſſion of the tumour of the face and hands, a premature ſuppreſſion of the ſalivation, or the like) doth it not ſeem neceſſary to carry off the offending matter by ſome other outlet, as particularly by the guts, which are much more eaſily and certainly ſollicited to a diſcharge than the pores of the ſkin, the urinary paſſages, or the ſalivary ducts? Indeed, when the ſalivation of courſe ceaſes, in my opinion, it ſeems proper to promote ſome other evacuation in its room; and if we uſe a clyſter, or a gentle purgative, we may readily reſtrain too great a diſcharge by an opiate.

It hath, and may be objected, to this practice, that it tends to draw the noxious humours from the external habit to the vitals. But to this I anſwer, that purging is more eſpecially pleaded for, when the incruſtation is formed, and the morbid matter concocted, at leaſt as much as ever it will be; for a due concoction, or maturation, is never to be expected in the lymphatic kind; that it is particularly contended for when an unfavourable metaſtaſis of the morbid matter hath already happened, and cannot well and readily be removed by other means; that this is ſubſtituted in the place of a ſuppreſſed critical evacuation, and that nature attempts, nay, ultimately requires, a diſcharge this way; that there is no other method of diſlodging the putrid colluvies in the inteſtines, that feeds the ſecondary fever, but this; and that whenever there is a great quantity of foul corrupt matter in the firſt paſſages, of what kind ſoever, there is a conſequent fever: witneſs verminious, capulary, bilious fevers, which cannot be carried off but by purging and vomiting; laſtly, that every one allows the abſolute neceſſity of purging at the cloſe of the ſmall-pox; otherwiſe boils, indurated glands, foul ulcers, carious bones, rotten lungs, or a conſuming hectic, certainly ſucceed.

But when I recommend purging in the ſecondary fever of the ſmall-pox, I would always adviſe to begin with the moſt lenient cool cathartics: the draſtic, ſcammoniate, aloetic purgers, are certainly highly improper till the fever greatly abates; then indeed ſome ſtronger purgatives (to which I always join ſome calomel) ſhould be uſed. The imprudent uſe of ſtrong hot purges at the beginning, the not giving a proper anodyne after the purges, and the want of duly ſupporting the ſick during the operation, have, I am perſuaded, been frequently attended with ill conſequences; but am very ſure, that purging in the ſecondary fever, in the manner I have adviſed, is of great ſervice, and I have ſeen very many inſtances of its great ſucceſs.

A

DISSERTATION

ON

PLEURISIES AND PERIPNEUMONIES.

CHAP. I.

Of the Power of the Winds and Seasons in producing these Distempers.

As pleurisies and peripneumonies are, and always have been, so very common, Hippocrates hath said much more upon them than on any other of the acute diseases; and his observations are found most perfectly just, and will be ever highly worthy of a diligent perusal by all physicians. One of them is, that cold north-easterly winds bring on disorders of the breast, sides and lungs;* and this hath been found constant and true by all his successors. Not but that pleurisies, and peripneumonies especially, are frequently observed in other constitutions of the air, the latter very often supervening other acute fevers. Yet still it is certain, these two diseases are much more frequent, when a cold, dry season, and northerly and easterly winds, have continued for any considerable time.

The obvious effects of dry cold winds on the human body are, constr nging the whole external habit, making the skin more dry and corrugated, shutting up its pores, and lessening perspiration, at least suffering only the thinner part of the humours to fly off. By a dry cold also the whole system of the fibres is made more strong, firm, and elastic, and the action of the vessels on the contained fluids, more vigorous and forcible; whence a brisker circulation, more heat, spirit, and activity; by which the globules of the blood are rendered more dense, compact, and numerous, and the whole mass of humours disposed to a greater degree of tenacity. It may be added, that as cold and dry air is almost always very heavy and elastic, by its greater pressure on the body, it will co-operate with its cold and dry qualities, in producing greater effects. It is fact that, *cæteris paribus*, blood drawn, in such prevailing constitutions of the atmosphere, is constantly found more dense and viscid than in long moist warm seasons; and that persons subject to asthmatic disorders, suffer most during the continuance of north-easterly winds.

However, all these effects may consist with high health, and commonly do

* Aphorism. 5. Sect. iii.

do so; and therefore Celsus (though reckoning up the disorders produced by cold northerly winds) says * *sanum tamen corpus spissat, & mobilius atque expeditius reddit.*

But, alas! such is the frail estate of mortal man, that the transition from high health to great disease is most easy and exceeding common. For this high, rich, dense blood, agitated by strong and vigorous vessels, is extremely apt to be wrought up to such a degree of viscidity, as makes it unfit to pass the ultimate ramifications of the arteries; from which, obstructions and consequent inflammations most easily arise; especially on any excess in diet, or exercise, on obstructed perspiration, or any sudden alteration in the temperature of the air, which may rarefy the humours in general much more suddenly than it can relax many of the particular vessels. Whence, by the bye, those pains in limbs, formerly broken, in cicatrices of old wounds, in callous concretions on the toes, &c. (where the minute vessels have been rendered more straitened in their capacities, and more rigid in their coats) are observed to rage on sudden changes of weather into stormy, or wet and warm; which nothing so soon removes as an emollient fotus, by enlarging and softening the vessels.—Every old woman tells you to soak your corns, when they pain you.—And this method also is of very great service in those pains of the side, which often remain after pleurisies or pleuro-peripneumonies, for years together, and which are owing to a preternatural coarctation of the vessels by the past disease, and the adhesion of the lungs to the pleura. And which many times, on great rarefaction of the blood, changes of weather, &c. bring on the disorder afresh, and make the patient subject to frequent returns of it for ever after.

It is true, indeed, that persons of a very viscid state of blood and rigid fibres, are subject to inflammatory disorders of all kinds, in all seasons; but some constitutions of the air, however, are not only more apt to produce this inflammatory blood than others, but also dispose more to inflammations of particular parts. For when very cold air constringes the external habit, corrugates the skin, and shuts up the pores, more blood than ordinary is forced on the internal and more vital parts, particularly on the lungs; which, by the vast expanse of their internal surface (greatly exceeding that of the whole skin*) are designed by nature to assist the skin, in exhaling off the superfluous acrid and vapid humidity of the blood; and therefore, where the pores of the skin are in any degree shut up, the exhalation from the lungs should compensate the defect of the cuticular discharge. And we in fact find, that, immediately on taking cold, the lungs are more or less affected by cough, a large discharge of thin rheum, and very often in a much severer manner. But when the very cold air is likewise continually admitted into the lungs, it also corrugates their internal membrane, shuts up its excretory ducts, and so hinders a due exhalation, and expiration, if I may so say, of the surcharge from the retained *perspirabile*. It may be added, that the air, by its great degree of coldness and nearness to the blood in the pulmonary vesicles and cellules, is apt to congeal, at least greatly to condense it. There have been many instances, where extreme cold air hath caused an absolute and sudden stagnation of the blood in the lungs, and killed almost instantaneously. We find often that very cold winds so affect and contract even the skin of the hands, arms, and face, as to make it rough, cracked, and sore. Why may we not suppose it hath a similar effect on the more tender and delicate membrane of the trachea arteria, bronchia, &c.? In truth, the cough, hoarseness, and soreness, we commonly feel in breathing such a cold

* Lib. II. Cap. I.

* See Dr. Hale's Vegetable Statics, p. 230.

a cold atmosphere, shew that it really hath so. The pharynx and larynx are very often so affected by severe cold winds, as to suffer violent inflammations, tumours, &c.

It is easy to conceive then, where a greater quantity than ordinary of dense fizy blood is thrown on the lungs, and where the vessels of the lungs themselves are inordinately constringed, and the excretory ducts and orifices of the glands of the wind-pipe, bronchia, &c. are considerably obstructed, that peripneumonic inflammations will be very readily generated.

But farther, a very viscid blood, (the natural consequence of a long, dry, cold constitution of the air) will not only dispose to inflammations in general, and to peripneumonic disorders in particular, but also to the pleuritic. For as the arteries, expanded on membranous parts, are extremely small, they are of course liable to be obstructed by a gross fizy blood: and hence rheumatisms are also very common in such seasons, the membranous parts of the muscles being inflamed by a viscid lentor. But the pleura is a membrane very largely extended, and spread over with an infinite number of very small arteries, ramifications of the intercostals, which arising nearly at right-angles from the aorta, by that means receive the more viscid part of the blood, as being the lighter (the heavier passing on nearer the axis of the great artery) and hence are exceeding subject to obstructions from an inflammatory lentor: and so are likewise the intercostal muscles, and periosteum of the ribs, which receive the blood, in part at least, from a like distribution of the arteries.

Hence pleurisies, as well as peripneumonies, are found exceeding common or epidemic, in very cold dry seasons; and in high cold situations, much exposed to north-easterly winds, they are commonly endemic. Indeed pleuritic disorders, properly so called, are apt to bring on the peripneumonic, and very frequently do so, for reasons which will be given hereafter. Hence it comes to pass, that we find many more pleurisies complicated with peripneumonic symptoms, than true and exquisite pleurisies; and this compound disease the moderns very properly call pleuro-peripneumony.

As these two diseases are so often conjoined, the ancients, as well as many of the moderns, have quite confounded them, ascribing the same symptoms both to one and the other indifferently; but there is a real difference certainly both as to the seat and symptoms of these two disorders. Indeed the ancients, as Cælius Aurelianus * informs us, were greatly divided in their opinion as to the seat of a pleurisy, some affirming it to be an affection or passion of the pleura, properly so called; others, of the lungs and its membranes. Both which opinions have had their respective abettors also among the moderns.—I flatter myself the following remarks will more fully explain their nature and method of cure.

CHAP. II.

Of the Peripneumony and Pleuro-peripneumony.

A Peripneumony, in the largest sense of the word, is a disease so common, either as an original malady, or consequent to some other, that its nature should be diligently studied by every physician; as it is a morbid affection of one of the principal organs of life, is very frequently attended with the utmost danger, and requires very different treatment in its different stages. Besides there are different degrees, I might say species, of this disease, which demand a particular attention, and a method of cure peculiarly adapted to each.

For a peripneumony, arising from a violent inflammation of the lungs, by a very fizy dense blood obstructing

* Lib. II. cap. xvi.

very

very many of the pulmonic and bronchial arteries, is a quite different disease, and requires a very different treatment from an obstruction of the lungs by a heavy, viscid, pituitous matter, as is the case in what late writers call a *peripneumonia notha*. And this again should be managed in a method very different from that, which is proper in one depending on a thin acrid defluction on the lungs. And yet there are some general symptoms common to them all, particularly a load at the breast, a short difficult breathing, a cough, and more or less of a fever; which few obvious symptoms, however, give the general denomination of a peripneumony, though in nature very different, and to be treated very differently. For in the first case, speedy, large, and repeated bleeding is absolutely necessary to lessen the quantity and force of the too rapid blood, with the most cooling, relaxing, diluting Diet and medicines. In the second, some blood indeed may be drawn off, at the very beginning, to prevent the farther impaction of the obstructing lentor, and make room for proper inciding diluting attenuants; but if you are too busy with your lancet, you weaken the patient, not the disease, which requires attenuants, dedetergents, expectorants, gentle pukes, and proper purges, with the free use of blisters, which I think are quite naught in the former case, unless towards the close of the disease, when they may be sometimes necessary.—The third case may require bleeding also, to hinder the advance of the inflammation; but here the soft, lubricating, demulcent method, with some proper and frequent opiates in moderate doses, are demanded, which in the second case would be utterly deleterious.

Great regard must be had also to the different stages, even of the same kind of peripneumony, and the different symptoms that attend it. For though at the beginning of a severe inflammation of the lungs, large and repeated bleeding may be indispensably necessary, yet if, after the second or third bleeding, the patient begins to spit off freely a well-concocted matter tinged with blood, you are to restrain farther evacuation that way: otherwise you weaken your patient without necessity, and often entirely suppress the expectoration to his utter ruin. And yet if a considerable quantity of thin, florid, spumous blood is spit off, you should draw more blood, quiet the cough with cool opiates, as diacodium, or the like, and give pretty freely of proper acids with soft cooling incrassants. Whereas, if it is a thin, glecty, dark-coloured matter that is expectorated, it is generally a mark of great malignity, and that the blood is in a putrefying dissolving state, and will by no means bear a large emission of blood. In short, the disease is quite another thing when the inflammation is forming, from what it is when the obstructing matter is concocted, or actually suppurated.

But to be more particular.—If a person just before in full health, should on violent exercise, debauch, or a severe cold, be seized with a great shivering, succeeded by burning heat, very much oppression and load at breast, with a very difficult, quick, hot respiration, and more or less of a cough, blood is to be drawn immediately, in a pretty large quantity from a large orifice. The stronger and more plethoric the patient, the larger the quantity, yet so as to stop an appearance of faintness, cold sweat in the forehead or face, yawning, and the like, which may in a great measure many times be prevented, by bleeding the person in a recumbent posture. In general, fat corpulent persons do not bear bleeding as well as the lean and muscular, as neither having so much of the red globular part of the blood, nor their vessels so elastic. Besides, the age and size of the person are to be considered, It would be absurd to draw as much from a dwarf as a giant, though both strong

ſtrong in their kind; the very young and the very old are not the propereſt ſubjects for it, though both ſometimes require it.

Sanctorius obſerves, that antecedent to fevers the body grows more heavy, and of courſe more plethoric; and the rigors ſhew a viſcoſity in the blood, that ſtagnates in the extremities of the capillary arteries: it may be even ſeen in the nails, lips, &c. by their growing pale and livid: and this encreaſing lentor will of courſe leſſen perſpiration, and encreaſe the quantity of humours. Generally the more violent the rigor or horror is at the attack, the more violent is the ſucceeding fever; and this may in ſome meaſure alſo guide us in drawing off blood, as we muſt expect, on a violent and long-continued rigor, a high fever, and a very viſcid ſtate of the blood.

If the ſymptoms are not relieved by the firſt bleeding, after eight, ten, or twelve hours, more blood ſhould be drawn, nay, even ſooner, if they become more aggravated; and this muſt be repeated, if the fever, oppreſſion, anxiety, and difficulty of breathing, encreaſe, or continue equally ſevere; eſpecially if the blood drawn appears very firm and denſe, or covered over with a tough yellowiſh coat, or buff, as it is called: which, however, very frequently doth not appear till the ſecond or third bleeding, though the ſymptoms may indicate a very high inflammation. And this very often happens by the trickling of the blood down the arm, from a ſmall orifice, too ſtrait a bandage, or by the ſliding of the ſkin over the orifice; by any of which, the blood is hindered from ſpouting forth in a full ſtream.

This denſe buffy appearance of the blood, with a firm ſtrong pulſe, will warrant the drawing off blood, till the reſpiration at leaſt becomes more free and eaſy. But if the craſſamentum, or concrete maſs, is of a very looſe texture, and not covered with a ſizy coat or buff, and the pulſe ſeems to ſink, flutter, or grows more weak and ſmall on bleeding, it is time to deſiſt, and try other methods of relief. A thin bluiſh film on the blood, with a kind of ſoft greeniſh jelly immediately underneath (the cruor itſelf being livid, looſe, and ſoft, with a turbid reddiſh or green ſerum) is a ſign of a very lax craſis of blood, and great acrimony, which will not bear large quantities to be drawn off. Nay, even a very florid, thin, looſe blood, that gives off little or no ſerum after ſtanding ſome time, however ſpecious it may appear to unexperienced perſons, is far from being the good blood they imagine; but generally argues, in this diſeaſe eſpecially, a very conſiderable advance to a putrid and very acrid ſtate. For by mixing ſpirits of harts-horn or ſal ammoniac with blood from the moſt healthy, as it runs off, it always puts on ſuch a florid appearance, and gives off little or no ſerum, how long ſoever kept, but ſtill remains looſe, and, as it were, half fluid.—It is obſervable that ſpirits of harts-horn uſed frequently, and in large quantities, diſſolve the blood, and brings on profuſe hæmorrhages; which, I think, is an obſervation that ſhould be well conſidered by thoſe who take ſo frequently and freely of that ſpirit.

A ſtrong, throbbing, quick pulſe in peripneumonies, always indicates farther bleeding, at leaſt till ſome degree of eaſe in breathing, or a free expectoration of laudable matter, is obtained.—But it frequently happens that the pulſe, even at the very beginning, ſeems obſcure and oppreſſed, irregular, ſluggiſh, and ſometimes intermitting, the patient at the ſame time complaining of great weakneſs and oppreſſion, which would ſeem to contra-indicate bleeding; and yet the load at breaſt, difficulty of breathing, great anxiety, and heat felt about the præcordia, loudly demand it. This often puzzles the young practitioner. But he ſhould conſider, that ſuch a ſudden want of ſtrength, ſpirits, and pulſe, doth not ariſe from

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want of blood, as the duration of the diſeaſe for a few hours, or a day or two, cannot be ſuppoſed to have exhauſted the vital liquid to any conſiderable degree. The truth is, not the defect, but the too great quantity of blood, in ſuch caſes, is the real cauſe of theſe ſymptoms. For the blood-veſſels being overloaded with humours, and diſtended beyond the due tone, cannot act with ſufficient vigor. The æquilibrium between the ſolids and fluids being not duly kept up, the moving veſſels are unable to protrude the blood with a due force; juſt as too great a weight on the embolus of a ſyringe, hinders its free play.—Hence, indeed, ſoon follows a deficiency of ſpirits, from want of a due circulation of the blood, and proper ſecretion of them; and hence a tendency to ſtagnation, concretion, and a large train of direful ſymptoms, and even death itſelf, unleſs timely prevented by ſufficient bleeding; which, by diminiſhing the too great quantity of blood, reſtores the æquilibrium between the ſolids and fluids, and a free action to the elaſtic muſcular canals, which now again exert more force on the contained humours, and carry on the circulation in a more regular and conſtant manner. All which tend to attenuate the too thick and viſcid blood, and render it more fit for the ſecretion of animal ſpirits, which may farther invigorate the action of the heart and veſſels. So that in ſuch caſes, letting of blood is ſo far from weakening, that it really raiſes the powers of nature; as is always evident on drawing blood from plethoric perſons, labouring under an oppreſſed pulſe, as it is properly called, which is found conſtantly to ariſe on bleeding.

In ſome very violent peripneumonies, where both the lobes of the lungs are greatly inflamed and obſtructed, an immediate and exceſſive weakneſs comes on, with an inexpreſſible anxiety, and oppreſſion at the breaſt, a very ſmall, weak, trembling pulſe, coldneſs of the extremities, with clammy, coldiſh, partial ſweats, the eyes ſtarting, fixed, and enflamed, the face bloated and almoſt livid; and all this ſoon followed with ſtupor, delirium, and I have ſeen in ſome caſes (though few indeed) with a complete paraplegia.

This is, in truth, a very dreadful caſe, but doth not ariſe from want of blood, but from want of a due circulation and diſtribution of it. For there being ſo many and great obſtructions in the branches of the pulmonic artery, the blood is ponded up in the lungs, and hindered from paſſing freely, as it ought, from the right ventricle of the heart to the left; ſo that the aorta and its branches, do not receive blood enough to carry on the common offices of life, on which ſoon follows an abſolute ſtagnation and immediate death. Diſſections have ſhewn this to be the caſe, the lungs having been found quite ſtuffed up with concreted blood, red, hard, and as it were fleſhy, or rather of the colour and conſiſtence of liver, and ſo heavy, that any part of them, cut off, ſunk in water.* If any thing can be done in this deplorable caſe, it is by early and immediate bleeding, or it becomes, in very few hours, utterly irrecoverable. I have ſeen ſome ſurpriſingly good effects from bleeding in both arms at once, when done in proper ſeaſon.

And yet there are ſome kinds of peripneumonies that will by no means bear large bleeding, as hath been noted by phyſicians of the beſt authority. And I have obſerved the ſame in ſeveral epidemic peripneumonies, particularly in the latter part of the year 1745, and the beginning of 1746†; during which we had an epidemic peripneumony, in which, after a ſecond bleeding (and even ſometimes after a ſingle bleeding) the pulſe and ſtrength of the patients ſunk to a ſurpriſing degree; and they

* Vid Hoffman. de Febribus pneumonicis Obſ. i.

† Vid. Obſ. noſtr. de Aere & Morb. epidem. Vol. II.

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ran into a ſort of nervous fever with great tremors, *ſubſultus tendinum*, profuſe ſweats, or an atra-bilious diarrhœa, with a black tongue, coma, or delirium; though at the beginning the pulſe ſeemed to be full and throbbing, and the pain, cough, and oppreſſion ſo very urgent, as to indicate bleeding pretty ſtrongly. Now in theſe caſes, the blood was ſeldom found buffy to any conſiderable degree, but commonly very florid, but of a very looſe and ſoft conſiſtence, or very dark coloured, and coated with a very thin and bluiſh or greeniſh film, under which was a ſort of greeniſh jelly, and a dark livid cruor at the bottom. Sometimes indeed the coat was much thicker and more tough, but of a pale red colour, reſembling the cornelian ſtone, or dilute jelly of red currants. This laſt appearance I have frequently noted in real pleuro-peripneumonies. Whenever I ſee ſuch a looſe diſſolved blood, I am very cautious how I adviſe farther bleeding, eſpecially if I find the pulſe or the patient become more languid after it, however the oppreſſion, load, or even pain, may ſeem to require it. It was from obſervations of this kind that Lanciſi, and Baglivi from him, caution againſt farther bleeding, when no ſizy coat appears on the blood in the ſecond bleeding: *in pleuritide, peripneumonia, &c. ſi in ſanguine e vena ſecta extracto non appareat in ſuperficie cruſta alba, —peſſimum;—ſi vero in altera ſanguinis miſſione incipiat apparere, bonum: contra ſi in ſecunda ne quidem apparebit, abſtincto ſtatim a ſanguinis miſſione, aliter interficies ægrotantem.* * And I concur with Baglivi in the firſt part of the prognoſtic, as well as the laſt, having always found the very florid blood, drawn in the beginning of pulmonic fevers, of very ill omen; for it ſhews, that either the craſis of the blood is much broken and diſſolved, or that the groſs inflammatory blood ſticks in the pulmonary arteries, and that nothing but the very thinneſt and moſt ſerous part can tranſude and paſs into the left ventricle of the heart.

I cannot but obſerve, however, that ſometimes in peripneumonies and pleuro-peripneumonies, the firſt and even the ſecond blood ſhall not appear buffy, and yet the third ſhall be very ſizy, and this particularly if the blood trickles down the arm, and doth not come off in a full ſtream; but then it is ever to be obſerved, that this blood, though apparently florid, when cold is very denſe and tenacious; whereas, in the caſe I mentioned above, the blood, though very florid, was of a very looſe and ſoft contexture, and never formed into a regular firm craſſamentum. Such a kind of looſe, diſſolved, florid blood, was frequently drawn from ſea-faring perſons in the beginning of the year 1746 †, and was always attended with very ill ſymptoms, very often fatal. Such malignant peripneumonies indeed very frequently happen to ſailors after long voyages, and to perſons very ſcorbutic. They grow firſt of all very ſhort-breathed, liſtleſs, and faint on the leaſt motion, and have tranſient erratic chills, heats, and pains all over their body; a fever ſucceeds, with a vaſt load on the præcordia, and a ſhort, importunate, dry cough, a very quick, ſmall, and much ſofter pulſe than uſual in true inflammatory peripneumonies, clammy unequal ſweats, and a perpetual reſtleſſneſs and anxiety; at laſt they begin to ſpit a thin, gleety, bloody, or very dark-coloured matter, frequently of a very offenſive ſmell: moreover, theſe are not uncommonly attended with an eruption of red, brown, livid, or black, petechiæ. The urine is commonly of a blackiſh dull hue, or of a fiery lixivial colour, as if a ſmall portion of blood was diſſolved in it: this is rendered in ſmall quantities, and without any manner of ſediment; but the former hath ſometimes a large livid hypoſtaſis, ſometimes nothing but a matter like coarſe bran irregu-

* Cap. de Pleuritide.

† Vid. Obſ. noſtr. de Aere, &c. Vol. II. Menſ. Jan. Febr. Martio.

larly ſcattered up and down it. As theſe ſymptoms are greatly argumentative of a broken craſis of blood, and high acrimony of the humours, large bleeding is not likely to be ſucceſsful, though too often imprudently uſed.

Though the appearance of a pretty thick ſizy coat on the blood is in general no ill ſymptom in pulmonic fevers, yet where it is exceſſively tough and extremely yellow, or of a pale lead colour, it threatens danger, and ſhews the inflammatory lentor is highly wrought up, and vaſtly difficult to be reſolved or attenuated, and that it will ſcarce admit of any commixture with any of the diluents that are taken in. This ſeems apparent from the odd ſhape the craſſamentum of the blood often puts on, of a globular, or rather a kind of an oblate ſpheroidal figure, after large and frequent bleeding in violent pleuritic or peripneumonic fevers; for then the cake of blood is found to ſwim in a great quantity of very thin, and ſometimes a quite limpid, ſerum; its greatly contracted concave ſurface, or coat, being almoſt as tough as leather, and the whole maſs nearly as hard and firm as a piece of fleſh. Now in this caſe, as a great deal of the globular part of the blood was drawn off by repeated bleeding, the craſſamentum is much leſſened in its quantity; but ſtill retains its greatly morbid viſcoſity, and its globules, being vaſtly denſe, attract one the other exceeding ſtrongly, as appears by the figure and conſiſtence of the craſſamentum, and tho' the proportion of the ſerum may have been greatly augmented by the uſe of plentiful diluents; yet it appears from the tenuity and limpidneſs thereof, that they have not been well mixed and united with the globular and ſulphureous or oily part of the blood. Nay, it is often obſerved, that thin, watery diluents are drank in large quantities, in theſe ſevere fevers, and rendered off by urine almoſt as limpid and inſipid as water *, or run off in vaſtly profuſe ſweats; not in the leaſt mixing, in a due manner, with the blood, properly ſo called, nor in the leaſt acting on the ſalts and ſulphurs thereof, their exceeding firm combination eluding the force of the diluters. I have repeatedly ſeen this in pleuro-peripneumonies, where the pain hath remained almoſt as violent as ever, after the fourth or fifth bleeding, and the globular part of the body hath been ſo reduced, as that the craſſamentum hath ſcarce been a ſixth part of the volume of the whole blood, and yet as ſolid as a piece of fleſh. Theſe caſes are generally mortal.

If after the ſecond or third bleeding, nay, if after the firſt, your patient begins to ſpit off freely a yellowiſh concocted matter, lightly tinged with blood, ſtop there, and particularly if the breathing becomes more free, as it commonly doth; otherwiſe you will weaken your patient to no purpoſe, nay, to a bad one, and quite ſuppreſs the expectoration, by which nature is now throwing off the diſeaſe by the moſt proper criſis, and ready outlet; the obſtructing matter in the extremities of the bronchial and pulmonic arteries being ſo far reſolved, concocted, or digeſted, as to paſs off freely into the cavities of the veſiculæ, bronchia, &c. and ſo up, and out of the trachea, by cough and expectoration: whence the extreme branches of theſe arteries become again paſſable, and the circulation through the lungs at laſt duly reſtored.

That there is a paſſage from the bronchial arteries into the cavities of the trachea and its ramifications is evident; for the oily mucus, which in a natural ſtate lines and lubricates the internal membrane of the aſperia arteria and its branches, is ſeparated from the bronchial arteries. And it

* Hippocrates obſerves that making water, immediately after drinking, is a dangerous ſymptom in pleuriſies and peripneumonies, Coac. Prænot. Sect. v. Ed. Lind.

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is certain that water, ſerum, &c. paſs freely from the pulmonary arteries into the bronchial veſicular cavities; as appears from the experiments of Ruyſch and the accurate Doctor Hales. Indeed, as the bronchial and pulmonic arteries, in their different ramifications, join by innumerable anaſtomoſes, even by this way the pulmonic arteries may have a communication with the bronchia. Now, when the obſtructing matter is ſo duly attenuated and concocted, and the veſſels ſo far dilated as to give a free paſſage, it is thrown into the cavities of the bronchia, and ſo out of the lungs by expectoration. It ſeems evident that the lateral, or ſerous branches of thoſe arteries, at their extremities, are ſo far dilatable as in ſome caſes to paſs red globules, and that too freely, into the cavities of the bronchia; as is particularly ſeen in thoſe ſpittings of blood, which are made *per diapedeſin*, as Galen and the ancients called it; for I think it is pretty certain, that ſome hæmoptoes do not ariſe from a rupture of the veſſels, as no manner of pain, purulence, or the like, precede, ſucceed, or accompany them.

But where theſe ſmall veſſels of the lungs are by nature or art made eaſily dilatable, they ſuffer leſs from inflammatory lentor, than where they are very rigid and elaſtic; as commonly happens in the robuſt and laborious, who, according to the obſervation of Hippocrates, are moſt ſubject to, and ſuffer moſt from, inflammations of the breaſt and lungs.* And this indeed is confirmed by every day's experience; and ſo is likewiſe the following remark of the ſame great father of phyſic, relating to the laudable expectoration I mentioned above, "Αἷμαλὶ δὲ ξυμμεμιγμένον μὴ πολλῷ πτύε-"λον ζωδὸν, ἐν τοῖσι περιπλευμονικοῖσιν, "ἐν ἀρχῇ μὲν τῆς νόσου, πλυόμενον περιε-"σηκὸν † καὶ κάρλα ὠφελέι": Hippoc.

* Coac. Prænot. 29. Lib. II. Cap. xvi. De Pleuritide, Edit. Dureti.

† So I chuſe to read with Foeſius rather than περιεκλικὸν as more agreeable to the ſenſe, and the Hippocratic diction.

Prognoſt. And indeed it hath been the obſervation of the very nurſes in ſome epidemic pleuropneumonies, and peripneumonies, that all thoſe who ſpit blood do well. However this is very far from being always true, unleſs the matter is conditioned as above: for whenever either very frothy, or ſincere florid blood is ſpit up, or black and partly coagulated, ſpongy, liver-coloured blood, it is quite otherwiſe; as it ſhews that there is nothing like reſolution, or digeſting of the obſtructing matter performed; but that the obſtruction being deeply radicated, and the impelling force of the heart vehement, ſome veſſels are burſt open, and an extravaſation of blood made into the cavities of the lungs, and ſo ſpit up. For when great obſtructions are formed in ſome parts of the lungs, the blood muſt be forced in greater quantities, and with greater rapidity, through the veſſels that are pervious; which hence, being over diſtended, frequently break, and the blood guſhes into the cavities of the bronchia, and many times in the inmoſt receſſes of the veſicular cells. What of this blood is ſpit off immediately appears florid and frothy, and does no farther damage; but the chief misfortune is, that a great part of it remains commonly in the lungs, and ſtuffs up the air-bladders, and compreſſes and obſtructs their blood-veſſels; which very much encreaſes the difficulty of breathing, and greatly hinders the circulation of the blood through the lungs. Beſides as it is exceeding difficult to be pumped up from theſe minute veſicular cells, by continuing there it grows more and more putrid, till at length it becomes a corroſive ſanies, that deſtroys the very ſubſtance of the lungs: but of this more hereafter.

As all the inflammations of the lungs will either quickly choak the patients by hindering the paſſage of the blood thro' them, or terminate in ſuppuration, gangrene, or ſcirrhoſity, if the obſtructing matter is not ſoon kindly reſolved, or digeſted; we ſhould be as early as poſſible in our endea-

vours to abate, and take off the inflammation by bleeding in due quantities: for when once an abſceſs is actually forming, bleeding can be of no farther ſervice. Nay, when once the plegmon is too far advanced to be reſolved, bleeding is really diſadvantageous, as retarding the next operation of nature, to free herſelf from the offending obſtructing matter, by a kindly ſuppuration: for by this means the matter is made to ſtagnate longer, and ſo grows more and more acrimonious; which at length, by affecting the adjacent parts, forms a much larger impoſthume than would have happened at firſt, if nature had been left to her own proceedings; nay, many times it ends in a downright gangrene, and ſometimes in an obſtinate ſcirrhoſity, making the ſhort remains of life extremely miſerable.

Phyſicians note in general, that, after the fourth or fifth day of a true peripneumony, bleeding is of little avail to prevent the ſuppuration; for moſt phlegmons begin to ſuppurate in that time, if not reſolved before: this will more eſpecially and ſooner happen in ſuch a part as the lungs, ſurrounded on all ſides by warmth and moiſture, and ſo near the heart acting on the inflammatory obſtruction with conſtant and great force. So that where the peripneumonic ſymptoms continue with great violence for four or five days or more ſucceſſively, an abſceſs or mortification is juſtly to be feared, and little advantage is to be expected from farther bleeding.

But yet, if either the pain returns with violence after having ceaſed a conſiderable time, or ſeizes another part of the breaſt, it is an argument that a new inflammation is forming, which indicates bleeding as much as the primary, though not to the ſame degree: for this acceſſary ſeizure being altogether of the ſame nature, and on the ſame organ as the former, requires the ſame method to prevent its advance and farther ill conſequences. The ſtrength of the patient, and pulſe, the violence of the pain, and difficulty of reſpiration, are in a great meaſure to determine the quantity: and ſome regard muſt be had alſo to the colour and conſiſtence of the blood, and the quantity and quality of the ſerum. I have ſometimes ordered bleeding the ninth or tenth day from the firſt attack, and found the blood almoſt as fizy as what was drawn the ſecond or third, and that too where the lancet had not been timorouſly uſed; but the craſſamentum, tho' exceeding tough, was greatly reduced in the proportion it bore to the ſerum.

It is commonly obſerved, that as ſoon as this ſecondary attack and pain come on, with any degree of violence, the expectoration, though before free and copious, ceaſes altogether, or is performed with very great difficulty; the violence of the pain not ſuffering the thorax to be duly expanded, and the muſcles of the lungs, breaſt, and abdomen to act with ſufficient force to eject the matter: not to mention that the inflammation hinders a due ſecretion of the lubricating mucus, which ſhould naturally be ſeparated to ſmooth over the internal membrane of the trachea and bronchia, and expedite the diſcharge of any matter contained in them.—And we eventually find that after the inflammation is abated by bleeding, the expectoration returns with eaſe and freedom.

So that though in peripneumonies and pleuro-peripneumonies you are chiefly to make your evacuations by bleeding before the fifth day; yet on freſh attacks of violent pain, difficult reſpiration and ſuppreſſed expectoration, you are to begin again, as it were, a-new*, but with great caution and moderation: as all relapſes, in theſe caſes eſpecially, are dangerous, the ſick growing daily weaker and leſs capable of bearing any conſiderable loſs of blood. And therefore it will be very imprudent, upon every little

* Hippocrates bled Anaxion the eighth day, becauſe the pains continued, and he did not expectorate, Lib. III. Epid.

pain,

pain, to have recourſe to bleeding; for more or leſs pain continues, particularly after pleuro-peripneumonies, very often a long time after the fever is quite gone off: *Debet prius ceſſare febris, & poſtea dolor affecti lateris*, ſays Baglivi.—But bleeding is, in a peculiar manner, leſs proper where a copious expectoration of laudable matter goes on pretty eaſily, though it ſhould ſtill continue tinged with blood, for the reaſon I hinted above, viz. that it indicates the reſolution and concoction of the matter of the new inflammation. Nay, it is for that very reaſon to be avoided, though often imprudently ordered, and aſtringents ſtupidly adminiſtered, to reſtrain this ſlight tinge of blood: but it is by perſons who have very little attended to nature's operations, and leſs to Hippocrates, her great interpreter.—It is without all doubt vaſtly more proper to alleviate the pain and importunity of the cough by gentle opiates, cooling ſoft demulcents, and eaſy expectorants.

I have only two things more to add on the article of bleeding in pulmonic diſorders. The firſt is, that bleeding in the ſaphæna, or foot, is much leſs practiſed in ſuch caſes than might be expected from the reaſon of things, and the certain experience of its great efficacy in ſpitting blood from the lungs; I mean, after ſome proper quantity of blood may have been drawn from the arm. Alexander the Trallian,* many centuries ſince, adviſed it as very uſeful in that caſe. The ſecond is, that where the pulſe and ſtrength of the patient ſeem not to favour blood-letting from a large vein, and yet the oppreſſive, laborious, painful cough, and ſuffocation, remain very urgent, drawing off blood by cupping on the ſhoulders, &c. may be done with ſafety, and frequently gives exceeding great relief in diſorders of the breaſt, as well as of the head, though the reaſons may not be ſo very obvious and aſſignable. However, it muſt be conſidered, that the greater part of the blood drawn this way is arterial blood; and that the uſe of bliſters, iſſues, ſetons, and even cupping, on thoſe parts, is very notorious in aſthmatic coughs, defluxions on the lungs, &c.; and ſeems to ſhew that revulſions and evacuations made this way may be very ſerviceable in inflammations of the lungs, and in event they are ſo.

Although bleeding in all inflammations of the lungs is indiſpenſably neceſſary in ſome degree, and ſometimes, when well timed and executed, quite curative; yet in general there are ſeveral other indications to be anſwered: for both the fever and the particular inflammation require a cool diluting regimen, and nitrous and relaxing medicines, together with a moderately cool air, and as much quiet as poſſible both of body and mind. It avails little to draw off ſome of the ſizy, obſtructing, inflammatory blood, if the remainder is not cooled, diluted, and thinned, and a farther generation of the inflammatory lentor prevented by nitrous attenuants, cool ſaponaceous medicines, diluting, relaxing, emollient drinks, emulſions, &c. which a hot regimen, hot medicines, hot air, much motion of body, and agitation of mind, tend greatly to encreaſe. Perſons in aſthmatic paroxyſms are under a neceſſity of keeping a quiet poſture, and of breathing cool air, or they are in immediate danger of ſuffocation; how much more ſo then are theſe neceſſary, where there is not only a great obſtruction in the veſſels of the lungs, but alſo an inflammation in their very ſubſtance? A cloſe, narrow, ſtifling room, is exceedingly incommodious to any perſon ſick of a fever, but much more ſo to thoſe ill of a peripneumony, as I have many times obſerved, eſpecially among the lower part of tradeſmen, when two or three families perhaps live in a houſe together. Celſus's advice is never more proper, nay, neceſſary,

* Cap. vii. p. 94. Ex Edit. Rob. Stephan. Lutetiæ, 1548. fol.

neceſſary, in any kind of fever than in the peripneumonic, *in amplo conclavi tenendus æger.** If ſuch cloſe rooms cannot be avoided, they certainly ſhould be frequently, but prudently, aired.

Few or no peripneumonies, or pleuro-peripneumonics, end well without a free and copious expectoration; for this is the natural criſis of theſe diſorders, as hath been noted by Hippocrates, and all judicious phyſicians, and the want of ſpitting off the morbid obſtructing matter in a due manner reckoned extremely dangerous, Αἱ ξηραὶ τῶν Πλευριτίδων ἄπνοοι χαλεπώταται.†—And again in the Prognoſtic ‖ he ſays, it is a very bad ſymptom when μηδὲν ἀναχαθαίρηται—ἀλλὰ πλήρης ἐὼν ᾖ ἐν τῷ φάρυγγι—The more eaſy, early, and large, the concocted expectoration is, ſo much the better. Indeed generally at the beginning it is crude and thin, but ſoon becomes of a whitiſh yellow colour and greater conſiſtence, when matters proceed rightly; and about the third day it is commonly ſtreaked with blood, or the blood is ſo incorporated with it as to give it a bloody tinge, *flavorubeſcens*, as Baglivi ‡ calls it, or, in the Hippocratic phraſe, Πτύελον ὕφαιμον. This kind of matter, when freely ſpit off, gives great relief to the reſpiration, pain, and oppreſſion at the breaſt, and generally terminates the diſeaſe in ſeven days.

But nothing more effectually promotes expectoration (by attenuating and reſolving the impacted matter) than drinking freely and frequently of cooling, relaxing, and gentle ſaponaceous diluents; ſuch as thin whey, the barley ptiſan with liquorice, figs, &c. the decoction or rather infuſion of the pectoral herbs, as ground-ivy, maiden-hair, coltsfoot, hyſſop, &c. Theſe ſhould be gently acidulated with juice of lemon or Seville-orange: if any thing more detergent is wanting to the above drinks, honey may be added: an admirable, natural, cordial ſapo, thrown almoſt out of the *materia medica*, I know not why, nor how; for where it gripes or purges one, it agrees with a thouſand; and even its griping and purging quality may be eaſily corrected by boiling. Hippocrates uſed oxymel and mulſum in ſuch caſes, and adviſes againſt drinking mere water in pulmonic fevers, as neither good for the cough, or to promote expectoration:* any, or all of theſe things, by turns, drank warm, anſwer the above intention exceedingly well, if taken in frequent but ſmall draughts, ſipping them as it were perpetually; for by this means much of the relaxing reſolving vapour is alſo drawn into the lungs, and much probably abſorbed by their imbibing veſſels; ſo that relaxing and diluting is thus carried on in a double manner, and of courſe very effectually. Very large draughts ſhould not be taken at once; for they overcharge the ſtomach, produce indigeſtion and flatulence, and force up the midriff too much, which greatly embarraſſes the reſpiration: therefore Hippocrates adviſes to drink in thoſe diſeaſes out of a cup with a narrow mouth,† probably both that the liquor and vapour might be preſerved warm longer, and that leſs might be drank at a time, and alſo that the ſteam might be more copiouſly carried into the mouth and noſe. However, ſtill he adviſes to drink freely to promote the expectoration, without which the patient dies: ‖ and many kinds of drinks he adviſes for this purpoſe, but particularly recommends barley-water, honey and water,

* Lib. III. Cap. vii. † Coac. Prænot. 3. Cap. xvi, edit. Dureti. ‖ Section xiii, edit. Linden. ‡ Cap. de Pleuritide.

* De vict. in Morb. acut. ſect. xxx. edit. Linden.

† Μὴ ψυχρὸν, ὀλίγον δὲ ἐκ βομβυλίου ἐκ ἐυρυστόμου; for ſo it ſhould be read, or ſimply βομβυλίου, as all the commentators agree, lib. III. de Morbis, ſect. xxiv, edit. Linden. See Galen, Erotian, and Foeſius, on the word βομβύλιος.

‖ Lib. I. de Morbis, ſect. xxvi. De Locis in Homine, ſect. xxx. xxxvii. edit. Lindeni, and in many other places.

ter, oxymel, and vinegar and water.

These relaxing emollient drinks and vapours are in a more especial manner necessary, when the expectoration is very difficult and tough, and for those of a strigose habit of body and very rigid fibres; such as hard labouring people, and those of a hot and dry constitution, generally are. For as a very dry air, whether cold or hot, is found to hinder a free and copious expectoration, a moist and warm * one cannot but promote it, by relaxing the vessels, and attenuating also in some degree the over-viscid humours. Baglivi † greatly recommends the *fervida potio* for resolving pulmonic obstructions; but I think a moderate degree of warmth is more proper both for resolving and relaxing. Fomentations applied too hot on the external parts, are found to incrassate the humours, and corrugate the skin, and are vastly improper upon inflamed parts. The vapours may be made more or less stimulating or relaxing as the case requires. I have known the fumes of vinegar itself of no small service in malignant peripneumonies: several kinds of medicines may undoubtedly be administered with great advantage by way of vapour: the steam of camphorated vinegar is no contemptible thing in many cases.

Hippocrates and the ancients were so sensible of the necessity of expectoration in pulmonic disorders, that they not only endeavour to promote it by the means I have mentioned, but also in difficult cases used much more powerful expectorants: ‖ the cream of barley with honey or oil, oxymel, hyssop, rue, galbanum, mustard, pepper, silphium, ‡ were some of the milder: in desperate cases, white hellebore, * elaterium, Ἄνθος χαλκῶ were advised: and desperate indeed they must be to be justified now-a-days; but as they had then no other, desperate remedies were to be tried in desperate diseases. We have a much more ample *materia medica*, and can avail ourselves of things of a much gentler nature. But I have several times given an emetic in peripneumonies with great advantage, when the expectoration hath been suddenly suppressed, and the difficulty of breathing greatly augmented; but it was when a proper quantity of blood had been drawn antecedently, and the violence of the fever abated: but in such cases very little should be drank after it to promote the vomiting. Oxymel scilliticum frequently doth great service this way, and its virtues in relieving asthmatic disorders are notorious: it not only, in a proper dose, pukes gently, but is also an excellent cooling attenuant, and useful eccoprotic, and a very good diuretic: it is undoubtedly greatly superior to simple oxymel, and may be so blended with oleaginous emollient medicines as to be highly serviceable as an easy expectorant. Where very soft, demulcent, lubricating medicines are indicated, our common linctus of spermaceti, ol. amygdal. dulc. or cold-drawn linseed-oil, with syrup. altheæ, papav. errat. diacodium, or the like, answer the intention. But where oils disagree, a mucilage of quince-seeds, or linseed with rob of elder-berries, or black currants, or their syrup, or that of poppies, is very useful and grateful. Nitre, that very necessary cooling attenuant, is very agreeably administered in either of these compositions; and perhaps camphor, given this way, is the least nauseous. The utmost care should be taken never to give strong expectorants in the beginning of peripneumonies, till proper bleeding, &c.

* Aretæus says, neither cold drink nor cold air are good in pleurisies.

† De Pleuritide.

‖ Ἰσχυρότατα ἐπαναχρεωπλήρια φάρμακα; De Locis in Homine, sect. xxx. Edit. Linden.

‡ Lib. III. de Morbis, sect. xviii. xxv. Edit. Linden, & alibi passim; and Aretæus advises much the same things in pleurisies and peripneumonies.

* Lib. III. de Morbis, sect. xvii. edit. Linden.

may have allayed the impetuosity of the blood and fever, otherwise they will encrease the inflammation and danger of suffocation, and eventually intercept what they were designed to pump up: the matter should be first concocted, and then expectorated. Another thing is also necessary to be observed in the use of such expectorants as oxymel scilliticum, oily medicines, gummose mixtures, and pectoral decoctions; and that is, that we do not bring on any considerable purging, which will certainly suppress the expectoration, and endanger the life of the patient.

Though a free expectoration of concocted matter is of the highest service in the cure of peripneumonies and pleuro-peripneumonies; and should be always encouraged, yet there are some kinds of expectoration of very ill omen.—It is particularly a very ill sign, when much sincere florid or frothy blood is spit up, and thus it is pronounced by Hippocrates and Aretæus, though they both speak so favourably of the concocted matter that is expectorated with a bloody tinge: the former condemns the Πτύελον λίην αἱματῶδες,* the latter the Δίαιμον ἀιθηρὸν σφόδρα; nay, Aretæus says, Ἐπί το Δίαιμον τῶν ἄλλων κάκιον,† and I think so too for the reason above-mentioned; for this fresh frothy blood proceeds from a rupture of arteries in the lungs, and not from a resolution of the inflammatory obstruction. Now, if arteries are burst in the lungs, the blood gushes into the cavities of the bronchia, sometimes in such quantities as to cause a sudden suffocation, if not immediately brought up; but more commonly it leaks into the pulmonary vesiculæ, and many times vessels are broke in the inmost recesses of the lungs, part of which may indeed be soon spit up fresh and florid, but much is very apt to remain in the ultimate ramifications and cellular interstices of the bronchia; which stuffs up the lungs, compresses the surrounding blood-vessels, and at length putrifies and corrodes all around it: hence a speedy suffocation, a dangerous vomica, or a direct gangrene, frequently ensues. This extravasated matter also may indeed be partly spit off in the form of a bloody sanies, or of livid and black concretions; but it is commonly with such difficulty, and so violent a cough, as even to encrease the extravasation: but it is generally so imperfectly, that much remains in the lungs, and produces most fatal consequences. Hippocrates * therefore declares such a kind of expectoration exceeding dangerous; and truly it is most commonly a sign of an impending mortification, or one actually formed. I remember many years since to have observed a matter spit up at the close of a peripneumony, by one Mr. Clark, a master of a merchant-ship, of this town, which exactly resembled pieces of boiled spleen, or rather more spongy, some of which were very fœtid: he died the 19th day of the disease. This corresponds with a prognostic of Baglivi † from Dodonæus: *Qui spuunt sanguinem nigrum porosum,* ‖ *ad instar spongiæ, iis pars aliqua sphacelo corripta est in pulmone, & omnes pereunt.*

As soon therefore as this expectoration of florid blood appears, I immediately direct bleeding in such quantities as are adapted to the strength of the patient, in order to abate the too rapid motion of the blood, lessen the inflammation, and prevent as much as possible the farther effusion of blood amongst the pulmonic vesiculæ and cellules, where it would do infinite mischief. If the hemoptoe continues, bleeding in the saphæna will be found of the utmost service.

* Coac. Prænot. 17. lib. II. cap. xvi. de Pleuritid. &c. ex edit. Dureti.

† Cap. de Pulmonaria.

* Prognostic. Coac. Prænot. 45. Cap. de Pleuritid. ex edit. Duret.

† Vid. Baglivi Opera, Lugduni, 1704. 4to to p. 87.

‖ Αἱματος θρόμβους μέλανας. Hippocr. lib. III. de Morbis, sect. xix. edit. Linden.

ſervice. Beſides this, cooling emulſions, nitrous, demulcent, mucilaginous medicines, vegetable acids, and even mineral, if the hæmoptoe be very conſiderable, are required: a decoction of red poppies, coltsfoot, and figs, acidulated with elixir of vitriol, makes an admirable drink in ſome caſes: and we muſt endeavour to moderate the violence of the cough by diacodium, a ſoft linctus, or the like. But I utterly diſapprove of ſtrong aſtringents, and large doſes of opiates, as I have often known the imprudent uſe of them, in ſuch circumſtances, bring on a vaſt orthopnœa, and moſt terrible ſymptoms: for the extravaſated blood muſt be ultimately ſpit off, or the patient never recovers; but this is impoſſible without more or leſs of a cough to pump it up. I have ſeveral times known very large impoſtumations happen after ſuch kind of peripneumonies, where the patient had ſurvived the fever for ſeveral days, nay, for ſome weeks.

Though a morbid viſcoſity commonly prevails in pulmonic fevers, yet there are not a few in which an acrid tenuity is predominant. And as we obſerve in ophthalmics, the defluxion ſometimes as thick as glue, ſometimes as thin as water, and ſharp as brine, fretting the very ſkin of the cheeks as it trickles down; ſo the matter expectorated in ſome peripneumonies is extremely thin and crude, and the defluxion ſo very acrid as to excoriate the wind-pipe, &c. and cauſe an inceſſant and very violent cough.

The ſharp thin humours in catarrhal fevers very often bring on peripneumonic ſymptoms, by cauſing a conſtant irritation and agitation of the lungs; and no ſmall miſchief likewiſe ariſes from the violent concuſſions that are occaſioned by the frequent ſneezing which commonly attend ſuch acrid catarrhs, which are ſometimes ſo virulent as to enflame the noſtrils, and bliſter the very lips.—The great father of phyſic, in his moſt admirable prognoſtic, hath pronounced it very dangerous when catarrhs and ſneezing precede or ſupervene peripneumonic diſeaſes.—I once knew very ſevere pleuropneumonic pains immediately brought on by a fit of ſneezing, after they had quite ceaſed for a very conſiderable time.

In this catarrhal peripneumony, if I may ſo term it, no great loſs of blood is neceſſary; ſome, however, ſhould be drawn, in the beginning, to abate the preſent inflammatory diſpoſition, and prevent future ill accidents. Bliſters alſo ſhould be applied early, to avert and draw off the acrid defluxion. And here even gentle purgatives are proper to carry off the ſerous colluvies. The author of the ſecond Book de Morbis, amongſt the Hippocratic writings,* adviſes to purge in an eryſipelas of the lungs, where the expectoration is large and thin. And I have frequently experienced the good effect of purgatives in theſe catarrhal peripneumonies, though they are utterly improper in thoſe that are attended with a laudable concocted expectoration. Much leſs drink is neceſſary in this peripneumony, than in the dry kind; ſome demulcent pectoral ptiſan, however, is proper to temperate the acrimony of the humours, and ſhould be taken warm with ſome mild diaphoretics, to promote eaſy breathing ſweats. Coffee, in this caſe, is both a pleaſant and profitable drink. Some gentle opiates likewiſe are required to moderate the cough, ſuch as diacodium, or elixir aſthmaticum, not in large doſes, but frequently repeated; with which may be joined ſpermaceti, myrrh, olibanum, and camphor, as they will alſo tend to incraſſate the thin catarrhal humour, and abate its irritation; which, as Hippocrates ſays, brings on peripneumonies, &c. which ceaſe as ſoon as the defluxion becomes more thick and concocted.†

* Sect. liii. Edit. Linden.

† De veteri Medicina, Sect. xxxiii. Edit. Linden.

But

But of much worse omen than this thin crude expectoration is the livid, gleety, and sanious, frequently resembling the lees of red wine, sometimes more black, and sometimes very fœtid; for this either proceeds from a gangrenous state of the lungs, or from a destruction of the crasis of the blood by very great acrimony, which is often the case in the highly scorbutic: a vast many instances of which we have lately had amongst the sailors, after long cruises, and West-India expeditions.—The blood drawn from such peripneumonies appeared in a dissolving putrescent state; the crassamentum loose and tender, the serum turbid and reddish. The black tongue, and teeth furred with a dark thick sordes, the offensive breath, and high-coloured or blackish rank urine, which were generally observed, denoted a great corruption of the humours; and the black spots, or bloody dysentery, which frequently appeared the fifth, sixth, or seventh day, more strongly evinced it. It was surprising how much the pulse and strength of the patient sunk after bleeding in such cases. With no small concern and astonishment I several times observed a vast anxiety, fainting, cold sweat, and a thready intermitting pulse, very soon succeed it; though at the very beginning of the fever, and when the pulse seemed strong and throbbing before. I have seen this even in pleuro-peripneumonies, where the pain of the side was violent, the load at breast great, and the cough considerable; otherwise the peripneumonic appearance might have been imagined to be a mere symptom of a malignant fever. I am very sure this putrid peripneumony never bore a second bleeding with advantage; seldom, indeed, the first, unless there was some considerable degree of firmness and tension in the pulse.* When I was diffident as to bleeding, I ordered scarification and cupping sometimes with success; though in one or two cases, the effusion from the scarifications was vastly profuse, and could not be totally restrained, till the patient expired.

Here, then, some anti-putrescent pectoral medicines are necessary; a decoction of figs, coltsfoot, and red poppies, well acidulated with juice of Seville-orange or lemon first, and then with gas sulphuris, or elixir vitrioli, is very proper. Nitre, olibanum, myrrh, flowers of sulphur, and bole, may be administered with conserv. lujulæ, rob of elder or currants, mucilage of quince-seeds, and syrup. de rubo idæo. Camphorated vinegar, with syrup of elder and rasberries, is an excellent medicine; a spoonful of these latter should be given ever and anon.

Sound cyder, and wine and water, with Seville-orange or lemon juice, drank warm, promote expectoration when deficient, and correct the alcalescent acrimony. Tincture of roses, with red poppy flowers, moderated an inordinate defluxion of the thin bloody ichor; frequently, however, oxymel scillit. & aq. cinnamon. fort. were necessary to pump up the matter, when a great rattling in the wind-pipe, and difficulty of breathing, indicated a vast quantity of it in the lungs: and yet very often the importunity and violence of the cough was to be appeased by elixir asthmaticum, diacodium, &c. Sago, panada, jelly of hartshorn, roasted apple, cream of barley, or thick gruel, with a little wine and juice of lemon, given little at a time, but often, were necessary to support the patient; even strawberries, rasberries, currants, and cherries, were sometimes indulged with advantage. Nor is this a new practice; for Aretæus † advises the fruits of the season, such as figs, &c. in the cure of pleurisies; and the same author very justly says, that food may be so adapted, as to

* Vid. Obs. nostr. de Aere, &c. Vol. II. Jan. Febr. 1746.

† De curatione Pleuritidis.

be

be made physic.* I have been more large in the dietetic part; for in a word, a proper support of the patients, and gaining time till the acrimony of the humours was corrected, and the lungs disburthened from the putrid colluvies, seemed to be the great affair; at the close, at least, the whole depended on a well-regulated diet, in which toast with diluted red-port-wine, mulled up with Seville-orange rind, mace, or cinnamon, and well acidulated, were remarkably useful. I seldom found blisters of any service in this case, often indeed mischievous, fretting much, and venting a vast deal of thin bloody matter, and sometimes attended with mortifications.

A very thin yellow spitting, as if tinged with saffron, is another ill symptom in pneumonic fevers; as either denoting that the inflammatory lentor sticks fast in the arteries of the lungs, and that nothing but the serous and thinnest part of the blood is strained through them; or else it shews that the whole mass of blood begins to dissolve, and its bilious principles to be highly exalted, and that all tends to a general putrefaction. In very putrid fevers even the milk, sweat, &c. turn yellow, and stagnant blood putrefying and dissolving always puts on that appearance. Hippocrates, indeed, commends that expectoration in which the yellow is strongly mixed with the spittle,† or an intimate mixture of yellow with white; but then he declares the sincere yellow spit (ξανθὸν ἄκρητον ‡) dangerous; and it is constantly found so, and is commonly attended with a violent cough, and brought up with exceeding great difficulty. Besides, it is many times succeeded by an hæmoptoe from a rupture of the vessels; and this particularly when the tongue appears very red, dry, smooth, and shining, with a kind of livid bladders* at the top, which, by the way, is a bad symptom in all kinds of fevers. It is carefully to be distinguished in practice, from which of the above causes this thin bilious expectoration proceeds; in order to which we should diligently consider the pulse, state of the blood, and temper of the body, for very different indications will arise from the different causes.

I shall conclude these remarks on the expectoration in pulmonic fevers, with the following observations of the great Hippocrates: "Matter should be spit off easily and early in peripneumonies and pleurisies; the colour of it should be a yellow well mixed with the spittle, or a concocted yellow matter that is tinged with some, but not too much blood. If this happens in the beginning of the disease, it is very advantageous, but is not so much to be depended upon after the seventh day. It is exceeding bad when there seems a great quantity, and rattling, of matter in the throat, and yet nothing is spit off. It is indeed, in all cases, dangerous when nothing is expectorated; but that which is very viscid, small, and globular, or frothy, is unprofitable. The sincere yellow unmixed spitting is bad; when very bloody, or livid, it is dangerous; especially when this appearance is very early; but that which is quite black, is worst of all. It is an ill sign also when it is very green (ἰώδες). Whatever is spit up with great difficulty, violent cough, and no relief to the pain and oppression, shews the case to be bad." See Coac. Prænotion. 13, 14, 15, 16, 17, 18. Edit. Eureti, Cap. de Pleuritide, compared with the Prognostic of Hippocrates, who says, a concocted expectoration is like

* Ἐν Τροφῇ γὰρ κείσεται τὰ φάρμακα, ἀτὰρ καὶ τὰ φάρμακα ἐν Τροφῇ. Ibid.

† Τὸ ξανθὸν ξαμμεμιγμένον ἰσχυρῶς τῷ πτυέλῳ. Prognostic. Sect. xiii. Edit. Linden.

‡ Ibid.

* Πομφόλυξ ὑποπέλιος on the tongue, Hippocrates pronounces dangerous, and that it precedes spitting of blood. Coac. Prænot. 6. Cap. de Pleuritide.

good pus,* not thin and glecty, nor very yellow, very bloody, green, or livid. Indeed in any abſceſs, or ulcer, ſuch colours are of very ill omen, as denoting a high degree of acrimony.

But when a reſolution, or concoction, of the inflammatory obſtructions of the lungs happens, not only part is thrown into the cavities of the bronchia, and ſo ſpit off, but alſo part of it paſſes on into the correſponding veins, and thence moves on with the reſt of the blood, in the common road of circulation; till at length it is partly carried off by thick turbid urine, in large quantities, depoſiting much reddiſh yellow-coloured ſediment, which, in peripneumonic diſorders, always betokens good, and partly alſo ſometimes by bilious ſtools. Hippocrates obſerves, that this thick ſubſiding reddiſh urine in pleuriſies, is a ſecure ſign,† and that it carries off peripneumonies when thick and plentiful.‡ He deſcribes theſe concocted urines as having ὑποχάσιας ὑπερύθρης ὁκοῖον Ὀρόβου; ‖ that is, a kind of a pale lateritious ſediment, as we call it. But he juſtly obſerves, it is an exceeding ill ſymptom, if, from being before thick, they grow thin about the fourth day; § and ſo it is indeed at any time of the diſeaſe, whilſt the fever continues very conſiderable.

Nothing promotes theſe urines and ſtools more effectually than emollient laxative clyſters, as they are a kind of fotus, and gentle ſtimulant, to all the parts of the lower belly, and not only tend to diſcharge urine and ſtool, but wind alſo, which ſometimes, by huffing up the abdomen and midriff, greatly ſtraiten the reſpiration. Beſides, when groſs excrements preſs on the bottom of the aorta and heads of the iliacs, too much blood regurgitates to the ſuperior parts, particularly the breaſt, which increaſes the inflammation, oppreſſion, &c.—Hippocrates therefore adviſes * cooling clyſters in peripneumonic fevers, eſpecially the firſt three days; † and Aretæus ſays, we ſhould inject an acrid clyſter, in ſome caſes, when we cannot well bleed. ‡ The greateſt care, however, ſhould be taken not to throw the patient into a profuſe diarrhœa, which will ſuppreſs the expectoration without relieving the diſeaſe; and accordingly the great oracle of phyſic ‖ ſays, it is a bad ſymptom where it happens to pleuritics and peripneumonics; becauſe when there is a great flux of humours downward, the ſuperior parts grow dry, the ſpitting ceaſes, and the ſick die; § ſo that the body ſhould not be too coſtive, which would encreaſe the fever; nor too looſe, ** leſt the ſpitting and ſtrength of the patient fail. This is Hippocratic phyſic, and I am ſure as rational and well founded as any of the modern. But to proceed:

Sometimes the morbid matter is critically tranſlated to the lower parts, producing phlegmons, impoſthumes, eryſipelatoſe or œdematous ſwellings, ulcers, &c. particularly in perſons formerly ſubject to ſwoln or ſore legs, which are frequently noted to ſwell, or break up again, at the cloſe of peripneumonic diſorders, to the great relief of the breaſt. It is a well-known thing, that on drying up ulcers in the legs ſuddenly, the lungs become forthwith affected; and that hydropic tumours of theſe parts, forced up by laced ſtockings, bandage, &c. immediately bring on aſthmatic diſ-

* Πέπονα δὲ ἐστὶ τὰ μὲν πτύελα, ὁκόταν γένηται ὅμοια τῷ πύῳ. De Vict. acut. Sect. liii. Edit. Lindeni.

† 586 Coac. Prænot. Edit. Foeſii.

‡ De Vict. acut. Sect. liii. Ed. Linden.

‖ Ibid.

§ Coac. Prænot. 53. Cap. de Pleuritid. 20. Cap. de Urinis, Edit. Dureti.

* De Affect. Sect. viii. Edit. Linden.

† De Vict. acut. Sect. lii. Edit. Linden.

‡ De curatione Pulmonar.

‖ Hippocrat. Aphoriſm. 16. Sect. i.

§ Lib. III. de Morb. Sect. xvii. Edit. Linden. ** Ibid.

orders,

orders, which sufficiently shew the natural consent there is between the breast and lower parts, and that they are reciprocally affected by disorders. Wherefore it seems rational, in severe pulmonic disorders, to attempt a derivation of the humours to the legs by tepid bathing, blisters, &c. And in fact this hath been often practised with success. How often do we find a metastasis of the gout to the lungs suddenly relieved by a revulsion of it to the feet by acrid cataplasms? Where there is great danger, we should neglect nothing. When blisters, applied to the legs in pulmonic diseases, ulcerate severely, they commonly give great relief; but they are often exceeding difficult to be healed up. This was particularly remarkable in the years 1740—41—46—47.*—I then also observed, that if the discharge from the ulcerated blisters was suddenly suppressed, not only the cough and difficulty of breathing returned, but sometimes a very great purging, and sometimes very profuse sweats forthwith came on. So that, in very few cases, the patient was either worn out by the pain and vast discharge from the blisters, or run down by a colliquative diarrhœa or sweat; terrible aphthæ frequently closing the fatal scene. Probably this arose from the great acrimony of the lymph and serum, which having been jellied as it were by the preceding fever, and now dissolving, was turned into a kind of putrid ichor (for when serum is coagulated by heat, its next state is a putrid liquamen, or dissolution). Nor did it only issue in profuse stools and sweats, but vented itself likewise by other ways, as very foul, sharp, turbid urine, pustular eruptions, angry boils, watery bladders, very painful and fretting on several parts of the body, as the shoulders, arms, back, breast, &c. From some observations of this kind, t is likely the ancients (who always carefully studied to follow and second nature's endeavours) applied acrid epithems, as salt, mustard, &c. to the breast, back, and shoulders, in pulmonic distempers. It is certain there is a great consent between the skin and the lungs, as is evident in a repelled itch, small-pox, measles, &c. which immediately fall on the breast.—Therefore blistering the above parts, after a proper quantity of blood is drawn off, should seem a rational practice, especially towards the decline of peripneumonic fevers.

Though nature takes sometimes different methods of relieving herself in peripneumonic diseases, yet her proper and common effort is by expectoration; and while that proceeds well, we may indeed favour her attempt, but never interrupt it, which violent purging, sweating, and the like, will infallibly do: so that those other, just now mentioned, seem only the by-ways of nature, and the morbific matter is then only to be strongly sollicited through them, when the high road is either stopped or greatly embarrassed.

* Vid. Obs. nostr. de Aere & Morb. Epidem. Vol. II.

CHAP. III.

Of the Peripneumonia notha.

WHAT I have said above, relates to the nature and management of inflammatory or true peripneumonies; but there is a disease, noted chiefly by Sydenham, and the later authors, under the name of a Peripneumonia notha, in which, though the load at breast is very great, the breathing very difficult, and the cough very importunate, and sometimes violent (all sufficiently denoting the lungs to be considerably affected) yet the fever and heat are small, many times scarce perceptible, the pulse either quick, weak, and small, or sluggish and oppressed, never hard and tense. So that as this distemper hath very different, and al-

moſt quite contrary ſymptoms to thoſe of a true peripneumony in ſeveral reſpects, it is reaſonable to ſuppoſe it ariſes from very different cauſes, and requires a very different method of cure. And in fact we ſee that baſtard peripneumonies commonly ſeize the old and phlegmatic, the weak and lax, the fat and unwieldy, and are moſt rife in wet, ſlabby, foggy weather, and winter ſeaſons; whereas the true inflammatory peripneumony generally attacks the robuſt, vigorous, and active, and is moſt frequent in cold dry weather, during north-eaſt winds, and high ſtations of the barometer. Theſe two diſeaſes, then, ſeem to differ almoſt as much as ardent and ſlow nervous fevers; or as much as an inflammatory quinſy doth from one that is purely humoral, or ariſing merely from a ſerous defluxion. And ſuch a ſerous acrid colluvies may fall on the lungs, be diffuſed into and amongſt the inmoſt receſſes of their veſicular and cellular cavities, and occaſion a great oppreſſion on, and ſome degree of obſtruction in, the pulmonic and bronchial arteries, and ſo greatly hinder a regular circulation of the blood through the lungs. The frequent chills and fluſhes of heat, however, the quickneſs and irregularity of the pulſe, anxiety and weight at breaſt, pain and giddineſs of the head, foulneſs of the tongue, &c. ſufficiently indicate a feveriſh habit.

Upon the whole, this diſeaſe ſeems to have its origin from a pituitous lentor of the blood, and a ropy diſpoſition of the lymph and ſerum, which being greatly redundant from ſuppreſſed perſpiration, &c. and put in motion by a febrile heat, or ſudden agitation of the humours, is thrown on the lungs faſter than it can paſs off (for viſcid humours never paſs as freely through the extremities of the arteries as when more thin and fluxile) whence being there more and more congeſted, it more and more obſtructs the pulmonic veſſels, till at laſt a total ſtagnation enſues, and death the conſequence. We ſee this exemplified in a particular manner, by bringing on an artificial peripneumony, if I may ſo call it, viz. let a girl labouring under a leucophlegmatic chloroſis (where ſuch a heavy viſcous pituita as I have mentioned, predominates) be forced into great and long-continued exerciſe; her lungs at length become ſo ſtuffed and loaded, that ſhe falls into a vaſt difficulty of breathing, and even an entire ſuffocation. This hath really happened in ſeveral inſtances, where the exerciſe hath been puſhed too far. I might have taken notice alſo, that ſuch a pituitous lentor of the blood and humours doth not give off a ſufficient quantity of animal ſpirits, to actuate the veſſels with force enough to carry on a due circulation.

As there are many intermediate ſtates between the violent inflammatory peripneumony, and this laſt mentioned, no diſtinct ſettled method of cure can be laid down, becauſe the peripneumonic malady, to be immediately treated of, may ſometimes incline much more to the inflammatory ſtate, and ſometimes much leſs.

For a diſeaſe is a diſorder in the animal œconomy, diſtinguiſhed indeed by ſuch and ſuch particular ſymptoms, and called by ſuch or ſuch a name; but each particular diſeaſe, in every individual patient, is conſidered by the attending phyſician, not according to the *nomenclature*, but according to the nature, cauſes, and ſymptoms of the particular diſeaſe in that particular perſon; and meaſures ſhould be taken accordingly. Thus if I meet with a great load and uneaſineſs at breaſt, a difficult hot breathing, cough, &c. with a full, ſtrong, quick pulſe, or a very tenſe and hard one, in a ſtrong and vigorous perſon, I have a ſufficient warranty to be much more free and frequent in bleeding, than when the oppreſſion, cough, &c. are not attended with

with such a rapid and strong, or quick and tense pulse; especially if I previously knew the labouring person to be of a weak, lax, or phlegmatic constitution.

So that when the pulse is weak and low, the heat little, or not considerably above the natural, the urine pale and crude, and so on, I must proceed with great caution in bleeding a pulmonic patient, though the load and oppression at breast may be very urgent. And in event, when blood is drawn from a person under a bastard peripneumony, it either appears loose, thin, and florid, or more commonly of a darkish livid hue, and not coated over with a thick viscid buff, as in common inflammations of the lungs. And it is observable that the patient soon sinks, and grows considerably weaker after such an evacuation, though, for the present, seemingly relieved as to the anxiety and load on the præcordia. For as bleeding, in this case especially, weakens the powers of nature, and the action of the solids on the fluids; the morbific lentor, the continent cause of the disease, is thereby encreased. Of this Sydenham himself was so sensible, that he particularly cautions against repeated bleedings in a peripneumonia notha, especially in persons of a gross habit of body, and that had passed the flower of their age;* though in a true peripneumony, he imagined he could as effectually vent the matter of the disease through the orifice of a vein, as by the trachea itself.† It is moreover certain, that common catarrhal fevers, in which a serous colluvies abounds, will not bear very large bleeding, much less a peripneumonia notha, where a slimy pituita is redundant.

But as bleeding, on the one hand, is to be used with great caution in this disorder, so, on the other, are very heating and stimulating medicines, especially at the beginning of the distemper; otherwise not only the oppression on the breast is greatly encreased, but a comatose disposition also is readily brought on. For the morbid lentor may be forced in too great quantities on the vessels of the brain, and accumulated there, as well as in the lungs; and evidently is so from the giddiness, pain, and heaviness of the head, which commonly attended the bastard peripneumony; for as the free descent of the humours from the head is considerably hindered by the too great repletion of, and almost stagnation in, the lungs, the right ventricle of the heart hath not sufficient room to play off its contents of blood, and receive others freely.

We should proceed, therefore, with great circumspection in treating these kinds of diseases, which are always dangerous, and frequently fatal; and the more so, as, at the beginning, the mildness of the symptoms is too apt to mislead both the patient, and less cautious or unexperienced physician, into a too great neglect or wrong management. I have seen it more than once, or twice, taken for a mere fit of hypochondriacism, where a very few hours have shewn the fatal mistake. But where a perpetual laborious wheezing, great anxiety, and constant oppression on the præcordia, comatose symptoms, cold extremities, and dark lead-coloured nails and visage are come on, the physician must be more stupid than the patient, not to see the immediate danger.

I think in general more or less blood should be drawn in the beginning; but as Sydenham well observes,* during the operation, let the patient be kept in a recumbent posture, by which means faintness, otherwise very apt to come on, will be avoided. For this not only lessens the too great load and distension of the vessels, but also makes room for such drinks and medicines as may be necessary in the process of the cure. But as to the repe-

* Cap. de Peripneumonia notha.
† Cap. de Pleuritide.

* De peripneumonia notha.

tition of bleeding, we ſhould be very cautious, and well conſider the ſtate of the blood, the ſtrength of the pulſe and patient, before we adviſe it. It is undoubtedly ſometimes neceſſary. We are frequently obliged to bleed repeatedly in aſthmatic paroxyſms, where there is no manner of fever.—Mild, attenuant, ſaponaceous medicines, thin diluting detergent drinks, and the application of bliſters, ſhould ſucceed bleeding. An infuſion of incidingi, deterging, pectoral herbs, as ground-ivy, hyſſop, penny-royal, liquorice, or a thin muſtard-whey ſweetened with honey and ſharpened with lemon, are proper for common drink. Some dilution is neceſſary in this diſeaſe, though nothing ſo much as in a true peripneumony, nor indeed doth nature call for it by any great thirſt; yet as the lentor, predominant in this diſorder, is moſt readily diſſolved by warm watery liquors, ſome are undoubtedly proper.

As a baſtard peripneumony is commonly attended with frequent urgings to vomit, I think it pretty clearly hints to us the expediency of relieving nature that way; and accordingly I have often experienced the good effects of gentle vomits in it, after ſome blood had been drawn off.—A ſpoonful or two of oxymel ſcilliticum, or vinum ipecacoanhæ, with a few draughts of muſtard-whey, or the like, are ſufficient. A large quantity of any kind of liquor ſhould not be drank. This not only pumps up much heavy pituita from the ſtomach and lungs, but alſo by the concuſſion it gives the whole vaſcular ſyſtem, promotes a general attenuation and fluxility of the humours; and a ſtool or ſweat commonly ſucceeds.

The mighty cures in pleuriſies, &c. boaſted of by Rulandus,* and others, with the antimonial aqua benedicta, were greatly owing to its emetic quality; and the famous Poudre des Chartreux,† or kermes mineral, gained ſuch high repute in pleuriſies, peripneumonies, and defluxions on the breaſt, in a great meaſure at leaſt, from the gentle efforts it creates to vomit. Undoubtedly it hath had good effects in catarrhal fevers, and pituitous peripneumonies; but to give either the one or the other in inflammatory peripneumonies, or pleuriſies, without previous bleeding, is utterly wrong, dangerous, and empirical.

Let me here take notice of what I many years ago mentioned, that the beſt of all the antimonial preparations I have ever tried (and I have tried many) is, in my opinion, the common vinum benedictum, or infuſion of glaſs of antimony in wine.* It is ſurpriſing we ſhould ſeek for any other, as this poſſeſſes the whole virtues of antimony. You may make it a rough emetic in a large doſe; you may give it in a few drops, ſo as merely to excite perſpiration. With it you may puke, you may purge, you may ſweat. From ten to fifty or ſixty drops, it is an attenuant, alterative, diaphoretic and diuretic; a few more gently purge; and every one knows a large doſe ſtrongly vomits. What will any other preparation of antimony do more? Here it is in *ſolutus principiis*, as the chemiſts ſpeak, in mere effluvia as it were, in the moſt highly attenuated manner, and moſt intimately and adequately mixed with the menſtruum; capable of paſſing and affecting the moſt intricate mæanders of the very minuteſt veſſels, and yet powerful enough to ſtimulate the great alimentary canal. The common ſolid preparations of antimony, are either a mere inert calx, or very uncertain in their operations, ſometimes very rough, ſometimes lying a long time in the ſtomach and bowels, and exciting very untoward ſymptoms; whereas this quickly acts, and as quickly paſſes off. It certainly is an admirable attenuant and deobſtruent, without heating a tenth part ſo much

* Mart Rulandi Curat. empiric. paſſim.

† See Memoires de l'Academie royale des Sciences, ann. 1720.

* Vid. Obſ. noſtr. de Aere, &c. Vol. I. page 140, there called Eſſentia Antimonii.

much as volatile alkalious salts, and in most cases much more safe and efficacious, particularly in the disease now treated of. In a word, it much more deserves the name of a catholicon, than any of the boasted nostrums that are quacked upon the world by the great W——d, or the meanest itenerant. In good hands it will certainly do great things. The timid, low, insipid practice of some, is almost as dangerous as the bold unwarranted empiricism of others; time and opportunity, never to be regained, are often lost by the former, whilst the latter, by a bold push, sends you off the stage in a moment.

Blisters should never be neglected in a peripneumonia notha, as not only serviceable from their attenuating and stimulating quality, but also as they drain off part of the morbid colluvies. A large one to the neck should always be set at the beginning, and epispastics to the legs and thighs, are often found to relieve the head and breast, when other methods fail. But as it frequently happens in this disorder that the limbs grow torpid and coldish (a very bad symptom!) they should be well rubbed before the blisters are laid on, and then well wrapped up in flannel (which, by the way, is frequently also necessary in low nervous fevers) for this very much promotes the rising of the blisters, and the consequent discharge.

When comatose symptoms, and a very different respiration remain after bleeding, you may draw off more blood by cupping and scarifying the neck and shoulders, when you cannot venture to open a vein again; and this hath frequently a surprising good effect. In a very threatening case you should blister on the scarifications.

Frequent stools are certainly useful in this disorder. Sydenham advises purging every other day,* after bleeding once and again, but I think this is over doing it in both respects. For though bleeding and purging too, may be necessary at the beginning, yet it is very seldom proper to repeat the former, and the latter must be managed with some caution, especially when repeated. For the patient is apt to fall into faintness, cold sweats, &c. unless properly supported during the operation; which, indeed, may be easily done; but surely in most such cases it requires more than small-beer, or water-gruel, to do it.—There is one thing to be observed as to both these evacuations, and that is, that if the sick spit largely a concocted matter, which is sometimes the case even in this peripneumony, neither one nor the other is proper; and laxative clysters, or mild eccoprotics, only should be given, at least during the copious expectoration; and thin mustard-whey, hydromel, or pectoral decoction, with a small quantity of soft white-wine in them, should be given frequently to promote it. Hippocrates, in several places, advises hydromel, and sweet and watery wine † in pleurisies and peripneumonies, to promote spitting. Diuretics in this case, if we are happy enough to succeed with them, are of very great service, especially provided we can promote a foul hypostatical urine. But the truth is, in this disorder very little is to be depended on urine, either as to crisis or prognostic; only a thin, pale, or limpid urine, is universally bad in pulmonic disorders.

Nitre, spermaceti, cinnabar, saffron, pulv. contrayerv. camphor, sp. vol. oleos. lac. ammoniac. and oxymel scilliticum, decoctions of figs, liquorice, and elecampane, are the most adapted parts of the materia medica in this distemper. The saline draughts, made with salt or spirit of hartshorn, and juice of lemon or distilled vinegar, are exceeding useful, as they promote expectoration greatly,

* Cap. de Peripneum. notha.

† Οἴνῳ γλυκυς καὶ ὑδαρὴς, Lib. III. de Morb. Sect. xxiv. Ed. Lind.

relieve

relieve the difficulty of breathing, and commonly operate by sweat or urine. But opiates, and oily mucilaginous medicines, are hurtful, and so are the highly stimulant and volatile, if given too early, though they sometimes have a good effect towards the end. But the different degrees of heat, fever, and difficulty of breathing, the state of the pulse, blood, and other concomitant symptoms, can only determine in what manner, and to what degree, very attenuating and warm medicines, or those of a cooler kind, may be made use of.

CHAP. IV.

Of Pleurisies.

A Violent pain on either side of the breast, attended with an acute fever, is commonly called a pleurisy; and this, whether it arises from an inflammation of the intercostal muscles, the periosteum of the ribs, or the pleura itself; which last indeed, in strictness of speaking, is only the true pleurisy, the former being species of an inflammatory rheumatism, and are called bastard, or spurious pleurisies. However, as they greatly affect the respiration, when violent, they are always attended with much more ill consequence than rheumatic pains in other parts of the body, and demand a particular regard, and a speedy removal.

For as the violence of the pain hinders a due expansion of the thorax, the respiration is immediately affected: hence the lungs, not being sufficiently inflated, the blood cannot pass freely from the pulmonic arteries, to the pulmonic veins, and so into the left ventricle of the heart. Whence a congestion, and some degree of stagnation of blood in the lungs will arise. Now as the right ventricle of the heart is continually throwing more blood into the pulmonic artery, its branches become more and more distended, till at length they are rendered so very turgid as to press on and obstruct the branches also of the bronchial arteries; and thus an inflammation of the lungs, or a compleat peripneumony, is often the consequence of a true, or bastard pleurisy, especially when the blood is very viscid. Indeed whatever interrupts a free inspiration and expiration, is apt to produce this. Thus oftentimes a quinsy brings on a peripneumony, the free passage of the air through the glottis into the lungs being obstructed. Frederick Hoffman * takes notice that even flatulent and spasmodic colics, continuing any time, are often succeeded by pleurisies and peripneumonies; the pains, spasms, and flatulence, impending the free action of the diaphragm; and partly also, as he says, by hindering a due passage of the blood through the viscera of the abdomen, by which too much is thrown on the lungs, pleura, &c. Very strait lacing, and straining for a fine shape, hath made many a fine girl spit blood, and ruined the lungs, by preventing a full and easy inspiration. A fractured rib, or even a simple contusion of the breast, very often brings on an hæmoptoe, cough, &c. In truth, when any of the muscles, that are but even subservient to respiration, are greatly affected, peripneumonic symptoms may come on. Monsieur Mery † mentions the case of a young man, wounded in the tendon of the pectoralis major, who was forthwith seized with a very great difficulty of breathing, and an acute fever. In a word, all kinds of pains in the breast, and pleurisies especially, are in a peculiar manner dangerous, as they are very apt to bring on more or less of a peripneumony, by causing a great interruption to regular and easy respiration. And this is the reason why we

* Consult. medicinal. Tom. I. Francof. 1734, 4to. p. 450.

† Memoires de l'Academie Royale des Sciences, 1713.

meet

meet with many more pleuritic fevers, accompanied with peripneumonic symptoms, than true and exquisite pleurisies. Where a severe pain of the breast is attended with an acute fever, load at breast, cough, difficulty of breathing, expectoration, or spitting of blood, this is always the case, and is very properly denominated a pleuro-peripneumony. Indeed it sometimes happens, that upon the coming on of the peripneumony the pain of the side ceases, which may happen when the infraction of the lungs is so great, that little blood passes from the right ventricle of the heart to the left, and the aorta is not half supplied with blood; so that the powers of nature sinking for want of it, all tend to an universal stagnation, and the patients become, as it were, insensible; or, as Aretæus * says, complain of nothing, though their pulse intermits, and their extremities are cold. I have seen several such instances.

About four years since, one Mr. Cam, a sailor, was seized with a complete paraplegia about the 9th day of a pleuro-peripneumony, and about twenty-four hours before his death. It is a fatal symptom, therefore, when the pleuritic pain suddenly ceases, and yet the difficulty of breathing, and load at breast, still continue or encrease. And the following aphorism is most certainly true: "A peripneumony supervening a pleurisy is dangerous.†"

But the nature and consequences of pleurisies will more fully appear from the following considerations:

1st. The inflamed pleura is apt to cleave to the external membrane of the lungs, and propagate the inflammation to them; and this will more easily happen, when, either by nature or disease, a previous cohesion had been partly formed. Hence those that have once laboured under a pleuro-peripneumony, are often afterwards subject to the like disorder; the callosity, as I may call it, formed by the concretion, straitening the blood-vessels of the pleura, and making them more liable to be obstructed by a sizy blood for the future. Not to mention the more or less impediment which the adhesion of the lungs to the pleura gives to full and free respiration.

2dly. As the external membrane of the lungs is only a continuation of the pleura itself, the inflammation may be diffused from one part of the pleura to another, and even to that which immediately invests the lungs; for it may spread a considerable space, just as we often see a small inflammatory speck on the eye, soon spread into a general inflammation of the whole globe, eye-lids, &c. Besides, the inflammation may primarily fall on this membrane of the lungs, and then pains, altogether like the pleuritic, will arise, though the internal membrane of the thorax, or pleura, may not be affected. I am quite of the experienced Hoffman's * opinion, that this is often the case.

3dly. The very mediastinum is but a duplicature of the pleura, and an inflammation may attack any part of it, or be propagated to it; in which case very acute pains are felt under the sternum, or between the shoulder-blades. This we sometimes meet with, and it is generally attended with great danger. Both Hippocrates † and Aretæus ‡ take notice of a dorsal pleurisy, in which the pain shoots from the spine to the breast-bone, attended with an orthopnœa, cough, and a very difficult and small expectoration. This seems to be the case mentioned. Sometimes the pain is forward, and directly under the sternum, where the mediastinum is attached to it, and in consequence

* De Pulmonaria.

† Hipp. Aphorism. 11. Sect. vii.

* Cap. de Febribus pneumonicis, Tom. IV. Parte i.

† Lib. III. de Morbis, Sect. xxi. Edit. Lindeni.

‡ Cap. de Pleuritide.

quence of it, apostems have been found in that part. When the pain seems to lie very deep in the chest, with a great load and anxiety, palpitation of the heart, and a constant inclination, as it were, to raise a cough, the pericardium (the external membrane of which is also from the pleura) is commonly inflamed.—Where the pain is spread all over the breast, with a great oppression, and perpetual darting pricking pains here and there, not only the mediastinum, but the external membrane of both lobes of the lungs, seem to be inflamed; the great difficulty of breath, load and anxiety, perpetual cough, and constant desire of sitting up erect, shew this to be the case; and a very dangerous one it is, as well as an inflammation of the pericardium. Inflammations of the mediastinum, pericardium, and membranes of the lungs, seem to be what the ancients called an erysipelas of the lungs: Hippocrates describes it as an acute fever, with great pain in the fore parts of the breast and in the back, with much load, seeming fulness, and a dry cough.*

4thly. The upper membrane of the diaghragm is likewise from the pleura, and may be either primarily inflamed, or secondarily from the inflammation of the pleura. And this certainly happens more commonly than is imagined. This is called a paraphrenitis, and is attended with a very acute fever, and a very violent pain extended from the lower ribs to the lowest vertebræ of the back, a short, convulsive, singultose kind of breathing, a vast anxiety and uneasiness, dry cough, hiccup, and delirium; an excessive pain is particularly felt on every inspiration, which darts itself from the pit of the stomach to the very loins; the hypochondrium of the side affected is drawn inwards and upwards † under the ribs, and the abdomen is scarcely perceptibly moved in respiration, but remains fixed and convulsed, as it were, by the violence of the pain, in attempting an inspiration.

Any part, therefore, of this widely-expanded membrane being inflamed, a kind of pleurisy is generated, in which the lungs themselves, by continuity, contiguity, cohesion, or sympathy, will soon become greatly affected. Nay, the lungs may, and often are, found to adhere to the mediastinum and diaphragm, as well as to the pleura commonly so called. But if the lungs should not adhere to any part of the pleura, peripneumonic symptoms may supervene an inflammation of it; because the let and hinderance it gives to a regular respiration, will greatly interrupt a due circulation of the blood through the lungs. The same may be said with respect to any considerable inflammation of the intercostal muscles, or periosteum of the ribs. Indeed, in these cases, the peripneumonic symptoms may not presently come on, nor commonly do they till after two, three, or four days; but as the inflammatory pain hinders a due expansion of the thorax, and a sufficient inflation of the lungs, they at length also may become greatly affected.

These then being too often the consequences of pleuritic fevers, we should endeavour to take off the inflammation, in a true or bastard pleurisy, as soon as possible, by large and repeated bleeding, cooling nitrous medicines and drinks, fomentations, opiates, &c. In a word, we should treat the case as a mere inflammation of the membranes, muscles, or periosteum; but when load at breast, cough, expectoration, &c. come on, we must have a regard to these also, as well as to the pain of the side, &c.

And it is that the nature, situation, and difference of the diseases of the breast and lungs, may be more easily known and distinguished in practice, that I have been so particular in describing

* Lib. I. de Morbis, Sect. xiii. Edit. Linden.

† Si septum transversum percussum est, præcordia sursum contrahuntur. Celsus, Lib. V. Cap. xxvi.

ſcribing them. For it would be no ſmall abſurdity to give expectorants, oleaginous linctus, and pectorals, in a ſimple inflammation of the muſcles of the breaſt, or pleura; even although a ſlight ſymptomatic cough, and ſome difficulty of breathing, ſhould attend, eſpecially at the very acceſs of the fever: whereas well-timed bleeding, and a proper regimen, would have ſoon carried off the diſorder. On the other hand, it would be altogether as wrong to reſt ſolely on bleeding and fomentations, where the lungs alſo were primarily, or even ſecondarily, affected in any conſiderable degree.

The diſtinction of pleuriſies into true and baſtard, hath a real foundation in nature, and is of ſome import in practice; for when the intercoſtal muſcles only are inflamed, much more is to be expected from topical applications, as fotus, cataplaſms, bliſters, cupping, and the like, than when the pain of the ſide is from an inflammation of the pleura, or external membrane of the lungs. The ſoreneſs to the touch, the pain on lying on the affected ſide, and chiefly on a full inſpiration, the tumor and redneſs of the part which ſometimes appear, diſtinguiſh this from the internal pleuriſy.

Beſides, there are ſome pains of the ſide, and thoſe too pretty ſevere, which ariſe from a ſharp acrid defluxion on the muſcles of the breaſt, and perioſteum of the ribs; and which much ſooner give way to topical applications, edulcorant medicines, and proper purges, than to bleeding, which in ſuch caſes is no farther neceſſary than to take off a plethora, if it ſuoſiſts. Indeed, where an acrimonious humour is the cauſe, you may bleed and bleed on to very little purpoſe but that of weakening your patient. Will bleeding cure obſtinate ſcorbutic or venereal pains? It may as well remove the pain from a rotten tooth, or a thorn in the fleſh.

The ancients well diſtinguiſh between wandering rheumatic or flatulent pains about the breaſt and ſide, and the truly pleuritic. Hippocrates juſtly ſtyles them Ἀλγήματα ἰσχυρῶς ἐπικότα ἄσημα,* and forbids bleeding in them. Theſe they attempted to cure by fomentations, purging, &c. not by bleeding; whereas the fixed ſyſtrophic inflammation of the breaſt, as the commentators call it, always required bleeding. And we eventually find erratic, ſcorbutic, rheumatic pains, much better carried off by purging, fotus, diaphoretics, and edulcorants, than by bleeding.—Some of them, indeed, give way to nothing but mercurials, antimonials, anodyne plaſters, cupping, or bliſtering; and ſome wear off only by time, patience, and exerciſe. When the pains are at the bottom of the thorax, in the hypochondria, or below the midriff, attended with borborygmi, and a tumid abdomen, clyſtering or purging is unqueſtionably proper: and yet theſe pains are ſometimes very acute, and, from the inflation of the inteſtines by wind, oftentimes accompanied with no ſmall difficulty of breathing; but, as Aretæus obſerves, they are very improperly called pleuritic. I have many times ſeen ſuch complaints vaniſh immediately on the uſe of a clyſter, or a few ſtools, to the ſurpriſe of thoſe who were ignorant of the cauſe. Bleeding, in this caſe, always encreaſes the flatulence and pain. This is entirely conſonant to the Hippocratic doctrine, and the truth of things; for the great dictator of phyſic ſays expreſsly, when the pain is below the ſeptum tranſverſum, and the abdomen is tumid, you ſhould purge gently with black hellebore, peplium, ſilphium, to which add cummin, aniſe, &c. that it may carry off the wind as well as the ſtool. †

But in all theſe caſes the pulſe, degree of fever, the tongue, ſituation of the pain, and manner of breathing,

* Shifting, erratic, ſlight pains, without the true pleuritic ſymptoms; Coac. Prænot. 491. Edit. Foeſii. Compare this with the caution about bleeding, at the end of Duretus's ſecond book on the Coac. Prænot.

† De Victu acutor. Sect. xiii. Edit. Lindeni.

pretty clearly discover to the judicious practitioner what is the matter, and what is to be done. When the pain of the thorax is violent, the pulse hard, tense, and quick, the fever high, the pains may be pronounced pleuritic, especially when a rigor preceded. True pleuritic disorders almost always begin with a rigor, and the pulse is very hard and tense, like the vibrations of a cord. The pains are very sharp, pricking, and fixed, not tensive and shifting, as the flatulent; nor uncertain, wide, and wandering, as the rheumatic. The hardness of the pulse is one of the most pathognomonic signs of an inflammation of membranous parts: when, therefore, pains lie under the sternum, or shoot from the spine to the breastbone, you may guess the mediastinum is inflamed by the tension of the pulse. The lungs, as Aretæus * says, being insensible (at least much less sensible) a vomica is often formed in the lungs without much attendant pain. The membranes of any organ are vastly more sensible than what is called its parenchyma, the ureters than the kidnies, the membranes of the brain than the brain. The hardness of the pulse then, and violence of the pain, may be the chief diagnostics in disorders of the thorax, and greatly determine as to bleeding, &c. I think the situation of the pain is not so much to be regarded as some make it; for as any part of the pleura, intercostal muscles, or periosteum of the ribs, may be inflamed, the pain may be felt in any part of the thorax. And I have known as severe pains near the bastard ribs, as in any other part. Hippocrates and his commentators determine bleeding to be then peculiarly proper, when the pain shoots up to the clavicle and shoulder; but in my opinion, when the pain is very severe in any other part, it is equally necessary. The pain is very low in a paraphrenitis, and yet none more loudly demands it. When the pectoralis major and serratus anticus minor are inflamed, the pain cannot but dart up to the shoulder, as their tendons are inserted near its articulation. This is often the case in a bastard pleurisy, and is most effectually relieved by bleeding and fomentations; but these would be as necessary if the intercostal muscles, or periosteum of any of the ribs, were inflamed.

Though some pains of the side may be greatly different from the pleuritic, and require much less bleeding, they should never be neglected, especially if they considerably obstruct the respiration; for then they are always followed with very ill consequences, a strong instance of which you have in the following history:

About Christmas 1728, Mr. T—ll, a worthy sober gentleman, about thirty, of a thin habit of body, but a lively active disposition, was seized with a pain in his right side, and grew a little feverish; the pain was so slight that he never confined himself. He was bled, however, and took some few things from his surgeon.—But finding the pain of his side daily encreasing, about three weeks or a month after the first attack, he consulted me. I found him under hectical heats, a short cough, and difficulty of breathing, which last, he said, proceeded merely from the pain of his side. He expectorated little, and that with difficulty; and it was now sometimes slightly tinged with blood. I ordered him to be bled, to take an oily expectorating mixture, lac ammoniac. oxymel. scillitic. the saline draughts, and pectoral decoction, and kept him to a cool diluting regimen. By these means, in a very few days, he began to spit off a vast quantity of purulent, bloody, and fœtid matter, which proceeded from a vomica in the left lobe of the lungs, for he felt a soreness in, and said that the matter came from, a place to the left of the sternum, towards the bottom of the thorax. At length very little was expectorated, and that neither fœtid nor bloody; and his cough daily abated, nor did any

* Cap. de Pulmonar.

any great load at his breast remain. A pectoral balsamic decoction of the bark, soon also took off his remaining heats and sweats; so that I flattered myself with hopes of his speedy recovery. But notwithstanding all these promising symptoms, the pain of his right side still continued, exactly in the same place where it first began; nay, it soon became exceeding violent, so that I thought it necessary to bleed him again, and even repeat it. I ordered also emollient fomentations, and an anodyne plaster of opium, camphor, and emplastr. e cymino; and these not availing, cupping on the part with scarifications. All was in vain, for the pain daily encreased, and nothing gave the least ease or sleep but repeated opiates. At last the part began to swell considerably, and manifest signs of an abscess came on, which I endeavoured by all proper methods to promote. In a few days the surgeon opened it, from whence issued an immense quantity of purulent matter, so much, that we imagined it came partly from the cavity of the thorax. Upon farther examination, we found two of the ribs foul and black, and two penetrations, one between the fifth and sixth of the true ribs (which were carious) and the other between the fourth and fifth, reckoning downwards. He, being exceeding weak, hectical, and emaciated, died March 29th, 1729.

On examining the body, some of the intercostal muscles, part of the serratus anticus major, and the supreme portion of the obliquus descendens, appeared black and sphacelated, and the impostume had extended itself almost home to the spine of the back. The lower part of the pleura was quite black, and the diaphragm also on that side livid. The upper perforation entered the right lobe of the lungs, which, for a considerable way round it, was purulent. In the left lobe we observed a kind of callosity, of a pretty large extent, where probably the vomica lay; and near the vertebræ a large tumour, bigger than a turkey-egg, in a state of suppuration. There were several other small tubercles, some very hard, and almost stony; some suppurated and full of pus.—Both lobes of the lungs were greatly diseased, and in some places quite livid. They adhered firmly to the pleura in a vast many places, some of the adhesions of a pretty large extent, some by a sort of fibrous ligaments.—In the right cavity of the thorax, was about half a pint of very fœtid dark-coloured matter.

Probably some obstructions were formed in this gentleman's lungs, antecedent to the pain of his side, as he had been sometimes subject to a short dry cough; but I am persuaded, the sharp humour that fell on the ribs and intercostal muscles, by hindering a free respiration, greatly contributed towards the obstructions and suppurations in his lungs; and by preventing also a due expansion of the thorax, it might encrease at least the adhesion of the lungs to the pleura.

I shall conclude this chapter with a word or two on the method of treating inflammatory pleurisies; in which, without all doubt, drawing off more or less blood is indispensably necessary, previous to any other attempt of relief. The strength of the patient, pulse, and fever, the violence of the pain, and difficulty of breathing, must determine the quantity. But let me add, the quality of the blood should also be nicely inspected, for a dense sizy blood not only indicates an abundant quantity of the red globules, but likewise its inflammatory disposition, and that the patient, if need be, can well bear large and repeated bleeding.

It should be duly considered, that if an inflammation of the pleura, &c. is not timely abated by bleeding, or resolved by proper diluting, antiphlogistic, emollient drinks and medicines, it cannot but end in an impostumation, or gangrene. Besides, these

pleurifies rarely fail of bringing on peripneumonic ſymptoms, if of any continuance; and therefore we cannot be too early and earneſt in endeavouring to take off the inflammation: for the pain thence ariſing, greatly embarraſſes the reſpiration, and of courſe the due circulation of the blood through the lungs, which being now alſo in a very viſcid ſtate (the immediate occaſion of the original pleuritic inflammation) is much more apt to ſtick in the ultimate branches of the pulmonic or bronchial arteries, than if it was more thin and fluxile. This is the reaſon why pains of the ſide, from inflammation, bring on peripneumonies much more frequently than when from a mere acrimonious defluxion, or the like. Here, therefore, Celſus's maxim is certainly right, *Remedium . . . eſt magni & recentis doloris, ſanguis miſſus*; and what he had is true likewiſe, *at ſi . . . vetuſtior caſus eſt. . . . ſerum id auxilium eſt* *

An emollient cooling clyſter ſhould immediately ſucceed bleeding, eſpecially if the body is coſtive, which not only empties the inteſtines of groſs excrements and flatus, but alſo derives a greater quantity of blood through the deſcending aorta and iliacs, and in both reſpects eaſes the ſuperior parts. † Hippocrates conſtantly adviſes to clyſter in the beginning of pleuriſies, and gives this exceeding good caution, that we ſhould neither ſuffer the body to be too coſtive, leſt it encreaſe the fever, nor too looſe, leſt both the ſtrength and ſpitting fail. ‡

This done, let the pained part be fomented with a decoction of ſem. lini,—Fœnugræc. flor. chamem. in milk and water. This was alſo the practice of the ancients; Hippocrates § ſays fomentations ſhould be tried both at the beginning, and afterwards to reſolve the pleuritic pains. Theſe, both of the dry and humid kind, he conſtantly adviſes in pleuriſies.—I have often ſeen them ſucceed, when repeated bleeding had proved ineffectual. Pain, eſpecially inflammatory pain, always ariſes from too great a tenſion of the fibres, which emollient fomentations, by relaxing, take off. I greatly prefer humid fomentations, or cataplaſms, to any thing of a dry heat in an inflammatory pain of the breaſt or ſide, as they without all doubt much more efficaciouſly relax. Hippocrates himſelf adviſes againſt uſing the dry ſtupes ‖ too long, and recommends thoſe that are moiſt § near the criſis. Celſus ſays we ſhould uſe the dry and hot, when the inflammation is a little abated, and then paſs on to the malagmata.* I commonly apply an anodyne plaſter of opium ʒi, camphor ℈i, emplaſtr. e cymino, after due fomentations, with very good ſucceſs, but always firſt try the humid fotus. In very threatening circumſtances, fomentations alſo may be applied to the abdomen, inguina, &c. which, by taking down the too great ſtricture of the fibres in general, will leſſen the impetuoſity of the blood. Emollient baths would be more effectual, when they can be conveniently uſed. Hippocrates ſays they relieve pains of the back, ſides, and breaſt. Their exceeding good effects in colics, and nephritic paroxyſms, ſhould prompt us to try them in very violent obſtinate pleuriſies, and a paraphrenitis.—The ancients ſuppoſed that warm applications digeſted the matter, and promoted expectoration; the latter they certainly do by eaſing the pain, and giving more liberty to the intercoſtal muſcles, &c. to expand and contract the thorax, and pump up the matter; hence in pleuro-pneumonies, they cannot but be of very conſiderable ſervice, even in that reſpect.

Nitrous medicines, with a cooling, emollient, diluting regimen, ſhould

* Lib. IV. Cap. vi.
† De Victu acutor. Sect. lii.
‡ Lib. III. de Morbis, Sect. xvii.
§ De Vict. acut. Sect. xi, xii. Edit. Linden.
‖ De Vict. acut. Sect. xii.
§ Lib. III. de Morbis. Sect. xxiii.
* Lib. IV. Cap. 6.

be forthwith entered upon. Thin whey, a decoction of barley and red-poppies, emulsions, and such like, answer all the intentions of drink; and nitre both cools and attenuates the blood. With these should be joined gentle anodynes, repeated as there may be occasion; elixir paregoricum and diacodium seem to me the most adapted. To these may be added spermaceti, a soft relaxing animal oil, very penetrating, though not heating; and where the rigidity of the fibres is very great, the cool vegetable oils, as of linseed or almonds, may be given with advantage. That an emollient relaxing method is indicated in the cure of pleurisies, is evident from hence, viz. that the strong and laborious persons, of very rigid fibres and dry constitutions, are most subject to this disease, and suffer most from it, and withal, that it rages most in cold and dry seasons.

The violence of pain unquestionably demands the use of opiates after bleeding, which, prudently interposed, are certainly of exceeding great service. As pain is a stimulus which greatly quickens the circulation, and heats the blood, and derives likewise more than natural to the pained part, it cannot but encrease the inflammation. A thorn in the flesh will cause some degree of fever, and an inflammation around it. Moreover, when a sharp cough attends, as in pleuro-peripneumonies, it should be mitigated by diacodium, or the like, else the great agitation it causes, will also encrease the inflammation. It is true, indeed, these demand some degree of caution and prudence in the use of them; therefore ever remember, before you enter upon them, the lancet is not to be sparingly used when the pain is very violent, the pulse very hard, quick, and tense, and the fever high.

The following instance shews what may and must be done sometimes in pleurisies and pleuro-pneumonies, when the attack is with extreme violence:

About four years since, a strong plethoric gentleman, about forty, was seized with a fever, and a violent pain in the side: he was immediately bled to sixteen or eighteen ounces: this abated the pain. He got up, sat by the fire in a smoaky chamber, drank near a quart of cold cyder, fell into a vast rigor, succeeded by a high fever, excessive pain of his side and breast, great difficulty of breathing, delirium, and the most incessant terrible cough I ever heard, which pumped up great quantities of fresh frothy blood. I was obliged to bleed him three times in twenty-four hours, and to give him seven grains of solid laudanum, besides two or three ounces of diacodium, in that short space of time; and this, and this only (for he would take no other medicine) happily recovered him. This indeed, is a very extraordinary instance: but the method which is above recommended, I have in a multitude of cases experienced to be very safe, and very effectual; infinitely more so, I think, than the *sanguis hirci*, *priapus tauri*, and the other whimsies which Helmont so greatly extols in appeasing the archæus, and quieting the pleura furens; * notwithstanding he is so very arch and severe on the sons of Galen and the schools, for attempting to cure pleurisies by bleeding.

In several epidemic pleurisies, I have known easy sweating, especially after the third or fourth day, of very great advantage; and with this view, have often added camphor to the nitre, &c. which, joined with small doses of elixir paregoricum out of thin warm whey, or ptisan, seldom or never fails of answering the intention. In chilly wet seasons, and persons formerly subject to catarrhal or cold rheumatic disorders, this is a very proper method, when a due quantity of blood hath been previously drawn off. In such cases also gentle purging

* Vid. Helmont. Pleura furens.

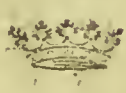
is

is useful. It is certain, from the best observations, that in some constitutions of the air, patients under pleuritic diseases will not bear the loss of much blood, particularly in continued wet foggy weather. In general we find they sustain the loss with much better effect, and less inconvenience, in a cold dry spring, than in a wet summer, or a rainy autumn. Nay, there are some pleurisies, at least vulgarly so called, that will admit of little or no bleeding, in which the pain of the side seems a mere symptom, not the disease; as the pains and soreness preceding or attending the putrid-malignant fever, small-pox, &c. are not properly rheumatic, but purely symptomatical. Such pains then arise from acrimony, not inflammation, and are to be cured by diluents, diaphoretics, eccoprotics, blistering, &c. not by bleeding, which is forbidden by the ancients where bile (by which they meant acrimony) is greatly predominant.

It was an observation of Asclepiades, * that the people of Rome and Athens did not bear bleeding in pleurisies and peripneumonies, as well as those about the Hellespont; the former lying to the South, and in a much more warm and moist air than the latter, who were much exposed to cold dry northerly and easterly winds. Hollerius makes the same observation with respect to the people of Paris, who lie pretty cold, and the inhabitants of the southern parts of France, who are more to the south, and much warmer. † Indeed, within a much narrower compass, I have once and again taken notice, than an epidemic disorder, which in low warm places near the sea proved only a slight catarrhal fever, and scarce required any manner of bleeding, hath, in the neighbouring cold and high exposures, been attended with severe pleuro-peripneumonic symptoms, and demanded no small evacuation of blood. Without all doubt, the very constitution of the solids and fluids differs considerably, according to the different situation of the inhabitants. Upon the whole then, let me add this corollary, that in practice we not only ought to consider the peculiar nature of the epidemic, but also of the season, and the constitution of the patients.

* Vid. Cæl. Aurelian. Lib. II. Cap. xxii. de Morbis acutis & chronicis, Amst. 1722. 4to.

† Holler. in Aphorism. 2. Hippocr. Sect. i.



APPEN-

APPENDIX.

A METHOD FOR PRESERVING THE HEALTH OF SEAMEN IN LONG CRUISES AND VOYAGES.

IT is well known what vast numbers of sailors we have lost within these few years, by terrible scorbutic disorders, owing chiefly to bad provisions, bad water, bad beer, &c. the unavoidable consequence of long cruises and voyages: for the provisions will naturally decay, the best beef and pork corrupt, the water spoil, and the beer (at least such as the navy is supplied with) will not keep good very long. Of course the long and constant use of such provisions must, by degrees, taint the juices of the body, produce great acrimony in the blood, and dispose it daily more and more to a state of putrefaction. These effects will be considerably augmented, by living continually in a moist salt atmosphere, and breathing the foul polluted air between decks. Constant experience shews this to be the case. I have known more than a thousand men put ashore sick, out of one single squadron, after a three months cruise, most of them highly scorbutic, besides many that died in the voyage. The fleet returns to its port; fresh air, wholesome liquor, fresh provisions, especially proper fruits and herbage, soon purify the blood and juices of the sick, and restore their health. The fresh air, provisions, fruits, and garden-stuff, which the English and Dutch meet with at St. Helena, and the Cape of Good Hope, are of the highest advantage to them in their East-India voyages, without which they always become extremely sickly.

Physicians well know that the most effectual method of correcting an alcalescent acrimony of the blood, and of preventing the farther advances of putrefaction in the humours, is by vegetable and mineral acids, the former of which are much the safest, and may be given in draughts, the other only by drops.

That the state of the blood in the common sea-scurvy is of this nature, appears from the stinking breath of the sick, their rotten corroded gums, high-coloured fœtid urine, sordid ulcers, black, blue, and brown spots, and eruptions in the skin, frequent feverish heats, foul tongues, bilious and bloody dysenteries, which more or less always attend it. Now it is also well known, that a vegetable acescent diet and regimen, fresh air, fresh provisions, subacid and vinous drinks, are its certain and speedy cure, when not very far advanced.—Apples, oranges, and lemons alone, have been often known to do surprising things in the cure of very deplorable scorbutic cases, that arose from bad provisions, bad water, &c. in long voyages.

But

But what will cure will prevent.—If therefore ſuch a diet and regimen can be uſed at ſea, it will prove a kind of a continual antidote to the rank putreſcent qualities of the common ſhips' proviſion, and correct (at leaſt very much leſſen) the ill effects: and it is eventually found, that the officers who carry wine, cyder, lemons, freſh proviſions, &c. are infinitely leſs affected with the ſcurvy, than the poor common ſailors who are not ſo provided.

Is it practicable then to introduce ſuch a general regimen into the navy? I think it is; and, from reaſon and experience, I recommend the following method:—

Let all ſhips, that are to proceed on a long cruiſe or voyage, be ſupplied with a ſufficient quantity of ſound generous cyder, the rougher (provided it is perfectly ſound) the better.

If apples are found of ſuch vaſt ſervice in the ſcurvy, ſurely the juice of them, when become a vinous liquor, cannot but be very ſalutary; and ſeems exceedingly well adapted, as a common drink, to correct, by its acidity, the alcaleſcent putrifying quality of bad corrupt proviſions. This cyder ſhould be at leaſt three months old before it is ſerved in, and quite fine. If it be too new, and foul, it is apt to give ſevere colics. It ſhould be racked off once at leaſt from its groſs ley into good and ſweet veſſels, which will contribute to its becoming fine, and prevent it from growing ropy, in which ſtate it is good for nothing. But if ſome of it ſhould turn to vinegar, which may frequently happen, it will ſtill be very ſerviceable; but it is found, when well managed, to keep good and ſound even to the Indies.

Every ſailor ſhould have at leaſt a pint of cyder a day, beſides beer and water: and I would adviſe alſo a frequent and free uſe of vinegar in the ſeamen's diet; eſpecially when the proviſions begin to grow rancid. Beſides this, the decks, &c. ſhould be frequently waſhed or ſprinkled with vinegar, after having drawn the groſs and foul air out of the ſhip by Mr. Sutton's contrivance, or by Dr. Hales's ventilators, which ſhould be done once at leaſt every day.

In autumnal cruiſes a quantity of apples might be alſo carried, which, when well choſen, and well put up in dry tight caſks, will keep very good for two or three months. Even lemons and oranges, wrapped in flannel (or ſomething that will imbibe their exhaling moiſture) kept in cloſe dry veſſels, and pretty cool, may be preſerved a long while alſo. If this is not ſo feaſible, a mixture of lemon-juice and rum (ſhrub, as they call it) may be carried in any quantity; as it will keep a long time, and would prove infinitely more wholeſome than the naſty firey poiſonous ſpirits, which are dealt about ſo largely in the navy and elſewhere. By the bye, nothing would more effectually correct the pernicious quality of theſe ſpirits than lemon-juice.

In the caſe of ſtinking water, juice of lemon, elixir of vitriol, or vinegar, ſhould be always mixed with it, which will render it much leſs unwholeſome. The Roman ſoldiers drank *poſca* (viz. water and vinegar) for their common drink, and found it very healthy and uſeful.

Elixir of vitriol and vinegar are already allowed to the navy in large quantities, and have been found greatly ſerviceable. And there was lately an order iſſued for ſupplying the ſhips of war with cyder alſo, which I am morally certain will be of the higheſt advantage, if properly and honeſtly managed. Indeed it hath already been actually found ſo in ſome few men of war, and other ſhips, where it hath been tried, even though in ſmall quantities. Let me add, that the prize wines, which are commonly low and thin, and very frequently ſpoil by keeping, might be diſtributed amongſt the ſailors (eſpecially in

in want of cyder) to very good purpose.

This indeed may be deemed a very expensive project; but, where the lives of so many brave and useful people are in the case, I think the cost should by no means come into competition with the advantage that may be received from it. The Romans constantly carried with them vinegar and wine in their fleets and armies, and the common soldier and sailor daily partook of both: nay, they were at many other considerable expenses to preserve the health of their armies, &c. Now, if that glorious prudent people thought the life of a Roman soldier so valuable, and were at such expense to preserve it, why should not we have as much regard to that of a British sailor, who is altogether as brave and as useful to the commonwealth?

I cannot conclude without taking notice, that the usual method of impressing seamen on their return from long and tedious voyages, void of necessaries, chagrined at not seeing their friends and families, and most commonly in a bad state of health, and not allowed time and opportunity to recover it, hath been the bane of thousands: and I could wish, for the honour of the nation, a method of manning our fleet could be found out more consistent with common humanity and British liberty.

PLYMOUTH,
Sept. 30, 1747.

A

DISSERTATION

ON THE

MALIGNANT-ULCEROUS SORE-THROAT.

SINCE the publication of my ESSAY ON FEVERS, I have had frequent opportunities of making obſervations on a diſeaſe of the putrid-malignant kind, which abundantly confirm my notions of the cauſe and cure of malignant peſtilential fevers; I mean what is called the *Angina maligna*, or *Ulcerous Sore-Throat*, which hath appeared up and down this kingdom for ſeveral years, in ſome places very common and exceedingly fatal, eſpecially to children.

The firſt accurate account we had of this diſtemper in England, was from the very ingenious Dr. Fothergill, in 1748. But ſeveral of the Spaniſh and Italian phyſicians have deſcribed exactly ſuch a kind of diſeaſe, as raging with great violence and mortality in Spain, and ſeveral parts of Italy, in the beginning of the laſt century.—Perhaps the Syrian and Egyptian ulcers mentioned by Aretæus Cappadox, and the peſtilent-ulcerated tonſils we read of in Ætius Amidenus, were of this nature; and truly ſome of the ſcarlet fevers mentioned by Morton, ſeem not much unlike it.

It is not above ſix or ſeven years ſince I met with it in this town and neighbourhood, though it raged with great fatality in and about Loſtwithiel, St. Auſtle, Fowey, and Liſkeard, a year or two before. From the latter part of the year 1751 to May 1753, it was very common in this town and places adjacent, eſpecially in the year 1752; and not only carried off children, but ſeveral adults.

As a faithful and accurate hiſtory of diſeaſes, their various ſymptoms, and method of cure, is the moſt effectual way of promoting the art of healing, phyſicians ſhould deſcribe, with the utmoſt care, the diſeaſes they would treat of, and the good and bad effects of any method, or medicines, they have uſed to remove them. But in a more particular manner is this neceſſary, when any new or uncommon diſtemper occurs, of which the peculiar pathognomonic and diagnoſtic ſigns ſhould be carefully laid down, and a particular account given of what evacuations, regimen, and medicines, were uſeful or hurtful in it. And this method I ſhall endeavour to purſue with the utmoſt attention in the following account.

A vaſt quantity of rain fell during the year 1751; the ſummer particularly was in general uncommonly wet, cold, and frequently ſtormy. At the beginning of June, however, we had exceeding hot weather, and ſome very ſultry days alſo in July and Auguſt; the atmoſphere was almoſt always

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thick and moist, but the barometer low commonly. The fruits of the earth were crude, watery, and insipid; the harvest was excessively bad, and the grain of all kinds suffered greatly. Notwithstanding this we had but little sickness, at least no very epidemical distemper; but the small-pox (brought in by Conway's regiment, in May) spread in this town considerably in July and August; and there were then several putrid and miliary fevers in the southern parts of this county. Indeed, though we were not here very sickly, yet hypochondriacal and hysteric disorders greatly prevailed, and there was a kind of universal inactivity and lowness of spirits every where.

The small pox became much more common in the autumn, and of a much worse kind than they were at their first appearance, and about the midwinter were very epidemic and fatal. In the mean time, there were abundance of catarrhs, mucous and inflammatory sore-throats, some pleurisies, and peripneumonies; and commonly eruptions of the erysipelatous or pustular kind, attended all these disorders.

The weather still continued wet, and often very boistrous; the wind various. December was a cold month, but wet from the 15th to the 25th. The same diseases continued, and, about the end of the year, were several malignant-ulcerous sore-throats up and down.

The year 1752 began cold, wet, and frequently stormy; the wind most commonly from the east, verging however considerably, now to the north, now to the south; the barometer often very low, though at the beginning of January very high, with sharp frost. The small-pox continued epidemic, often crude, crystalline, and undigested to the very end; sometimes very confluent, small, and sessile; some black and bloody, and now and then attended with petechiæ.—Pleuro-peripneumonies and rheumatisms were not uncommon; catarrhal and mucous squinsies, with much cough and a large thin spitting, were very rife; and now also there were several malignant dangerous sore-throats, with no small degree of fever.

Both at the beginning and end of February the mercury was high, and the air clear, dry, and frosty; but, from the 8th to the 21st, there was much rain, with the wind generally at south. Many small-pox were in the town, though few in the neighbourhood; several pleurisies, peripneumonies, and rheumatisms, a vast quantity of catarrhal mucous sore-throats, and many inflammatory squinsies, and still some of the malignant kind.

The weather was pretty cold and dry in March, especially at the beginning and latter end, and the barometer high; at no time very low. The small-pox grew more mild, and much less frequent; the other diseases also less common, but more inflammatory; no malignant sore-throats; many were severely tormented with coughs and obstinate asthmatic disorders. The blood now drawn was commonly more dense and viscid than it had been for many months.

The north-east wind prevailed at the beginning of April, and rendered the air dry, clear, and pretty cold; the baroscope high. A showery season succeeded for four or five days, and then the dry north-east wind returned; from the 21st it was W.N.W. The small-pox still up and down, some of a bad sort; many pleurisies; and peripneumonies, rheumatism, jaundice, and dropsy frequent; severe coughs every-where; a vast many are troubled with worms, even adults as well as children.

Though we had some agreeable weather in May, the summer was wet, cold, and uncomfortable; the atmosphere thick and foggy, the barometer seldom high, the S.W. and N.W. winds were much the most frequent. The fruits of the earth did not ripen well, but were watery and insipid; a

bad harvest, bad grain. A great dejection of spirits, listlessness, and lassitude, were universally complained of. The small-pox became much more numerous in June, and were epidemic all the summer, and rather of a worse kind than in the spring, not only here, but every-where in the neighbourhood; they were frequently confluent, very small, and sometimes black, attended with hæmorrhages of the nose, especially in children; but the petechiæ were much less common than I expected; sometimes they were very crude, crystalline, and indigested, running into large blisters, eroding the skin greatly. Rheumatisms, gout, and coughs, were in vastly greater plenty than usual at this time of the year.

Now also, exactly such a kind of fever as I called, in my first volume of Epidemics, *febris anginosa*, raged up and down with great violence, attended with scarlet or pustular eruptions, and succeeded with great itching and desquamation of the cuticle. In this the pulse was commonly hard, quick, and small, the breathing hot and laborious, with great oppression on the præcordia; the urine sometimes crude and pale, sometimes high-coloured and turbid, but without sediment; a delirium generally came on soon. The sick commonly bore bleeding at the beginning with advantage, and the blood was often sizy, though much less so in general, than squinsies of the truly inflammatory kind; they very seldom, however, admitted of large bleeding, scarce, indeed, of a second.

In all sorts of fevers, there was a surprising disposition to eruptions of some kind or other, to sweats, soreness of throat and aphthæ. The small-pox were more fatal in August, and sometimes attended with a very dangerous ulceration in the throat, and difficulty of swallowing. Indeed the malignant ulcerous sore-throat was now also frequent, probably sometimes complicated with the small-pox.

The autumn was much more fair and comfortable than the summer, particularly the month of October was for the greater part beautiful and serene; the mercury high; however, the atmosphere was generally thick, and sometimes very moist, the wind commonly from the eastern quarters. November was less wet and stormy than usual, and in general warm; the barometer pretty high, but the air thick and humid. At the beginning of December the quicksilver was exceeding high, the air cold and dry, wind E. N. E. but from the 6th to the 26th very wet and foggy, sometimes boistrous, and the barometer sunk very much; towards the end the easterly wind returned, raised the mercury, and restored fine cold weather.

During this period, the small-pox continued epidemic every-where, and though somewhat more mild in September and October, yet here and there they were very confluent, attended with spots and hæmorrhages of the nose. In December they were often crude, numerous, and undigested to the last, running into very large vesications, deeply eroding the subjacent parts: the crusts of the black confluent many times remained for at least thirty days after the eruption. The anginose fever also still continued, and we had several of the malignant sore-throats in September, many more in October; in November and December they were exceeding common in this town, at the dock, and all around us, and carried off a great many adults, as well as children. During this time likewise catarrhal mucous sore-throats were innumerable, but with little severity or danger. In October particularly, after a few days of foggy, stormy, rainy weather, we had from the 12th to the 16th very cold mornings, and immense hoar frosts, with some ice, in which time hundreds of people were

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at once seized with a cough, sore-throat, and a great defluxion from the nose, eyes, and mouth, attended with a slight fever, and more or less of a rash, several with great fluxes of the belly. Coughs, catarrhs, rheumatisms and fluxes, were excessively common in November and December, especially catarrhal coughs, with which almost every one was in some degree troubled; and yet there were few peripneumonies or pleurisies; however, abundance fell into a pulmonary phthisis, and many died tabid.

For many months past we had scarce the slightest fever, but it was attended with a sore-throat, aphthæ, and some kind of cuticular eruption, and that too even in pleuritic and peripneumonic disorders, so greatly did the constitution of the air, &c. seem disposed to produce eruptions in all sorts of feverish indispositions.—The blood drawn from the diseased, during all this time, hath been very rarely viscid, but generally florid seemingly, especially at the very beginning of the malady, and of a very loose texture.

Thus ended the year 1752.—The following part of the winter, and succeeding spring, was very cold and wet; the cold weather continued till the middle of May, and made a very backward spring. Then came on very fine hot weather, and we had the warmest and most beautiful summer that hath been known for many years. The small-pox, and both catarrhal and malignant squinsies, grew less frequent, and less fatal, from January to May, when both entirely ceased. As the spring advanced we had several pleurisies, peripneumonies, and a vast number of catarrhal disorders. The blood now drawn, was much more dense and viscid, in general, than had been observed for many months before.

I have given this short account of the constitution of the air and diseases during this period, in which sore-throats of one kind or another were much more frequent than I ever before remember, and with which also cuticular eruptions of various sorts, were exceedingly common, and this too even in the slightest fevers that happened. And this I have particularly done, that perhaps from it some rational conjectures of the cause and nature of such disorders may be made. Did the long cold and wet seasons occasion them, by hindering a due and regular perspiration? The suppressed perspirable grows very acrid, and productive, at length, of a variety of diseases, particularly such as pass under the general name of scorbutic, as well as more immediately of catarrhs, squinsies, peripneumonies, fluxes, colics, &c. which are notoriously the effects of suppressed perspiration. But my present design is not to enter into disquisitions of this nature. I proceed, therefore, to give the most exact account I possibly can of the malignant-ulcerous sore-throat, as it raged here during the period above described, especially in 1752; to which I shall subjoin the method of cure I found most successful.

The attack of this disease was very different in different persons. Sometimes a rigor, with some fulness and soreness of throat, and painful stiffness of the neck, were the very first symptoms complained of. Sometimes alternate chills and heats, with some degree of head-ach, giddiness, or drowsiness, ushered in the distemper. It seized others with much more severish symptoms, great pain of the head, back, and limbs, a vast oppression of the præcordia, and continual sighing. Some grown persons, on the contrary, moved about for a day or two, neither sick or well, as it were, but under uneasiness and anxiety till they were obliged to lie for it. Thus various was the disease at the onset. But it commonly began with chills and heats, loa and pain of the head, soreness of throat, and

and hoarſeneſs, ſome cough, ſickneſs at ſtomach, frequent vomiting and purging, in children eſpecially, which were ſometimes very ſevere, though a contrary ſtate was more common to the adult. There was in all a very great dejection of ſpirits, very ſudden weakneſs, great heavineſs on the breaſt, and faintneſs from the very beginning. The pulſe in general was quick, ſmall, and fluttering, though ſometimes heavy and undoſe. The urine commonly pale, thin, and crude; however, in many grown perſons, in ſmall quantities, and high coloured, or like turbid whey. The eyes were heavy, reddiſh, and, as it were, weeping; the countenance very often full, flushed, and bloated, though ſometimes pale and ſunk.

How ſlight ſoever the diſorder might appear in the day-time, at night the ſymptoms became greatly aggravated, and the feveriſh habit very much encreaſed; nay, ſometimes a delirium came on the very firſt night, and this exacerbation conſtantly returned in the evening, through the whole courſe of the diſeaſe. Indeed, when it was conſiderably on the decline, I have been often pretty much ſurprized to find my patient had paſſed the whole night in a phrenzy, whom I had left tolerably cool and ſedate in the day.

Some few hours after the ſeizure, and ſometimes cotemporary with it, a ſwelling and ſoreneſs of the throat was perceived, and the tonſils became very tumid and inflamed, and many times the parotid and maxillary glands ſwelled very much, and very ſuddenly, even at the very beginning, ſometimes ſo much as even to threaten ſtrangulation. The fauces alſo very ſoon appeared of a high florid red, or rather of a bright crimſon colour, very ſhining and gloſſy, and moſt commonly on the uvula, tonſils, velum palatinum, and back part of the pharynx, ſeveral whitiſh, or aſh-coloured ſpots, appeared ſcattered up and down, which oftentimes encreaſed very faſt, and ſoon covered one or both the tonſils, uvula, &c. theſe in event proved the ſloughs of ſuperficial ulcers, which ſometimes, however, eat very deep into the parts. The tongue at this time, though only white and moiſt at the top, was very foul at the root, and covered with a thick yellowiſh or brown coat.—The breath alſo now began to be very nauſeous, which offenſive ſmell encreaſed hourly, and in ſome became at length intolerable, and that too ſometimes even to the patients themſelves.

The ſecond or third day, every ſymptom became much more aggravated, and the fever much more conſiderable, and thoſe that had ſtruggled with it tolerably well for thirty or forty hours, were forced to ſubmit. The reſtleſſneſs and anxiety greatly encreaſed, as well as the difficulty of ſwallowing. The head was very giddy, pained, and loaded; there was generally more or leſs of a delirium, ſometimes a pervigilium, and perpetual phrenzy, though others lay very ſtupid, but often ſtarting and muttering to themſelves. The ſkin was very hot, dry, and rough; there was very rarely any diſpoſition to ſweat. The urine pale, thin, crude, often yellowiſh and turbid. Sometimes a vomiting was urgent, and ſometimes a very great looſeneſs, in children particularly. The ſloughs were now much enlarged, and of a dark colour, and the ſurrounding parts tended much more to a livid hue. The breathing became much more difficult, with a kind of rattling ſtertor, as if the patient was actually ſtrangling, the voice being exceeding hoarſe and hollow, exactly reſembling that from venereal ulcers in the fauces; this noiſe in ſpeaking and breathing was ſo peculiar, that any perſon in the leaſt converſant with the diſeaſe, might eaſily know it by this odd noiſe; from whence, indeed, the Spaniſh phyſicians gave it the name of

garotillo,

garotillo, expressing the noise such make as are strangling with a rope. I never observed in one of them the shrill barking noise that we frequently hear in inflammatory squinsies. The breath of all the diseased was very nauseous, of some insufferably fœtid, especially in the advance of the distemper to a crisis; and many about the fourth or fifth day spit off a vast quantity of stinking purulent mucus, tinged sometimes with blood, and sometimes the matter was quite livid, and of an abominable smell.—The nostrils likewise in many, were greatly inflamed and excoriated, continually dripping down a most sharp ichor, or sanious matter, so excessively acrid, that it not only corroded the lips, cheeks, and hands of the children that laboured under the disease, but even the fingers and arms of the very nurses that attended them. As this ulceration of the nostrils came on, it commonly caused an almost incessant sneezing in the children, but few adults were affected with it, at least to any considerable degree. It was surprising what quantities of matter some children discharged this way, which they would often rub on their faces, hands, and arms, and blister them all over. A sudden stoppage of this rheum from the mouth and nostrils, actually choaked several children; and some swallowed such quantities of it, as occasioned excoriations of the intestines, violent gripings, dysentery, &c. nay, even excoriations of the anus and buttocks. Not only the nostrils, fauces, &c. were greatly affected by this extremely-sharp matter, but the wind-pipe itself was sometimes much corroded by it, and pieces of its internal membrane were spit up, with much blood and corruption, and the patients lingered on for a considerable time, and at length died tabid, though there were more frequent instances of its falling more suddenly and violently on the lungs, and killing in a peripneumonic manner.

I was astonished sometimes to see several swallow with tolerable ease, though the tumour of the tonsils and throat, the quantity of thick mucus, and the rattling noise in breathing, were very terrible, which I think pretty clearly shews that this malignant squinsy was more from the acrimony and abundance of the humours, than the violence of the inflammation.

Most commonly the angina came on before the exanthemata; but many times the cuticular eruption appeared before the sore-throat, and was sometimes very considerable, though there was little or no pain in the fauces: on the contrary, a very severe angina seized some patients that had no manner of eruption, and yet even in these cases, a very great itching and desquamation of the skin sometimes ensued; but this was chiefly in grown persons, very rarely in children. In general, however, a very considerable efflorescence broke out on the surface of the body, particularly in children, and it most commonly happened the second, third, or fourth day; sometimes it was partial, sometimes it covered almost the whole body, though very seldom on the face. Sometimes it was of an erysipelatous kind, sometimes more pustular; the pustules were frequently very eminent, and of a deep, firey, red colour, particularly on the breast and arms, but oftentimes they were very small, and might be better felt than seen, and gave a very odd kind of roughness to the skin. The colour of the efflorescence was commonly of a crimson hue, or as if the skin had been smeared over with juice of rasberries, and this even to the fingers' ends; and the skin appeared inflamed and swoln, as it were; the arms, hands, and fingers, were often evidently so, and very stiff, and somewhat painful. This crimson colour of the skin seemed indeed peculiar to this disease. Though the eruption seldom failed of giving some manifest relief to the patient, as

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to anxiety, ſickneſs at ſtomach, vomiting, purging, &c. yet I obſerved an univerſal firey eruption on ſome perſons, without the leaſt abatement of the ſymptoms; nay, almoſt every ſymptom ſeemed more aggravated, particularly the fever, load at breaſt, anxiety, delirium; and I knew more than one or two patients die in the moſt raging phrenſy, covered with the moſt univerſal firey raſh I ever ſaw; ſo that, as in the highly-confluent ſmall-pox, it ſeemed only to denote the quantity of the diſeaſe, as I may term it.

I had under my care a young gentleman, about twelve years of age, whoſe tongue, fauces, and tonſils, were as black as ink, and he ſwallowed with extreme difficulty; he continually ſpit off immenſe quantities of a black, ſanious, and very fœtid matter, for at leaſt eight or ten days. About the ſeventh day, his fever being ſomewhat abated, he fell into a bloody dyſentery; though the bloody, ſanious, fœtid expectoration, ſtill continued with a moſt violent cough. He at length indeed got over it, to the very great ſurpriſe of every one that ſaw him.

Now, in this patient, as ſevere and univerſal a raſh broke out upon him the ſecond and third day as I ever met with; and the itching of the ſkin was ſo intolerable, that he tore it all over his body in a moſt ſhocking manner; yet this very great and timely eruption very little relieved his fever and phrenſy, or prevented the other dreadful ſymptoms mentioned.

An early and kindly eruption, however, was moſt commonly a very good omen, and, when ſucceeded by a very copious deſquamation of the cuticle, one of the moſt favourable ſymptoms that occurred; but, when the eruption turned of a duſky or livid colour, or prematurely or ſuddenly receded, every ſymptom grew worſe, and the utmoſt danger impended, eſpecially if purple or black ſpots appeared up and down, as ſometimes happened; the urine grew limpid, and convulſions came on, or a fatal ſuffocation ſoon cloſed the tragedy.

The diſeaſe was generally at the height about the fifth or ſixth day in young perſons; in the elder not ſo ſoon; and the criſis many times was not till the eleventh or twelfth, and then very imperfect: ſome adults, however, were carried off in two or three days, the diſtemper either falling on the lungs, and killing in a peripneumonic manner, or on the brain, and the patient either died raving or comatoſe. In ſome the diſeaſe brought on a very troubleſome cough, purulent expectoration, emoptoe, and heetic, in which they lingered on for ſeveral weeks, and then died tabid.

If a gentle eaſy ſweat came on the third or fourth day, if the pulſe became more ſlow, firm, and equal, if the ſloughs of the fauces caſt off in a kindly manner, and appeared at the bottom tolerably clean and florid; if the breathing was more ſoft and free, and ſome degree of vigour and quickneſs returned in the eyes, all was well, and a ſalutary criſis followed ſoon by a continuance of the ſweat, and a turbid, ſubſiding, farinaceous urine, a plentiful expectoration, and a very large deſquamation of the cuticle.

But if a rigor came on, and the exanthemata ſuddenly diſappeared, or turned livid; if the pulſe grew very ſmall and quick, and the ſkin remained hot and parched, as it were, the breathing more difficult, the eyes dead and glaſſy, the urine pale and limpid, a phrenſy or coma ſucceeded, with a coldiſh clammy ſweat on the face or extremities, life was deſpaired of, eſpecially if a ſingultus and choaking, or gulphing in the throat, attended with ſudden, liquid, involuntary, livid ſtools, intolerably fœtid.

In ſome few patients I obſerved, ſome time before the fatal period, not

not only the face bloated, ſallow, ſhining, and greaſy as it were, but the whole neck vaſtly ſwoln, and of a cadaverous look, and even the whole body became, in ſome degree, œdematous, and the impreſſion of a finger would remain fixed in a part, the ſkin not riſing again as uſual; an indication that the blood ſtagnated in the capillaries, and that the elaſticity of the fibres was quite loſt.

As there were ſo many different kinds of ſquinſies and eruptive diſorders during the period in which the malignant-ulcerous ſore-throat raged, the likeneſs of the ſymptoms, at the very beginning of theſe various diſeaſes, made it not a little difficult, to the younger and leſs experienced practitioners eſpecially, to know what methods to purſue at the onſet, particularly as to the common evacuations; ſeeing it was now certain, from ſufficient experience, that in what is called the malignant-ulcerous ſore-throat, bleeding and purging, to any degree at leaſt, were utterly improper.

Though I really think our gentlemen in the medical way, that practiſe in this part of the kingdom, are in general as careful, capable, and judicious, as in moſt parts of England, yet I took ſome pains with them to make them comprehend the nature of this ſingular and uncommon diſtemper, and to diſtinguiſh it aright from ſome other reigning diſorders, that bore no ſmall reſemblance to it: and having deſired them to attend to the ſmall, quick, unequal, fluttering pulſe, at the attack of this malignant ſquinſy, though indeed it was ſometimes full and undoſe, but even then heavy and unequal—to the ſudden great dejection of ſpirits and ſtrength—perpetual anxiety, ſighing, and great oppreſſion on the præcordia—heavy, dull, watery, and as it were weeping eye—pale, crude, thin urine, though often turbid, like whey—to the whitiſh but commonly moiſt tongue, though conſiderably furred near the root—to the ſhining crimſon colour of the fauces, with interſperſed white or aſh-coloured ſpots or blotches, with a nauſeous and ſometimes very fœtid breath—to the ſcarlet or crimſon efflorescence (in ſome erysipelatous, in others puſtular) on the hands, arms, neck, breaſt, &c.; ſymptoms that attended this diſeaſe even on the very firſt days; they diſtinguiſhed better, proceeded with more caution, and with greater ſucceſs.

I met with too many inſtances before, of raſh large bleeding and purging in this diſtemper; nay, ſome were weak enough to tell me, the blood they had drawn was very fine and rich. Florid, truly, I found it, as lamb's blood, but ſo ſoft and looſe that you might cut it with a feather, giving off little or no ſerum, but having exactly ſuch an appearance as when ſpirit of hartshorn is poured to the blood juſt as it runs from the vein, which prevents its natural coaggulation.

I will not ſay but that, in ſome plethoric adult perſons, ſome blood may be drawn at the very beginning of this diſeaſe, and I have in ſome few ordered it with advantage, particularly as to the anginoſe ſymptoms, and where the difficulty of breathing alſo was conſiderable; but I muſt ſay, a repetition of the bleeding to any conſiderable degree is extremely detrimental, where the firſt blood eſpecially was of ſuch a looſe and ſoft texture; for the ſecond or third will be always found a mere ſanious gore, as I have too often noted; nay, ſometimes I have obſerved the firſt blood drawn covered with a very thin, whitiſh, or lead-coloured ſkin, pretty tenacious; but immediately underneath it was a greeniſh ſoft kind of jelly, and at bottom a very looſe black craſſamentum, ſcarce at all cohering.—This appearance of the blood, however, as much forbids farther bleeding as that above deſcribed, and is moſtly obſerved when there is a throbbing pulſe, and a great heat at the acceſs of the diſtemper. I profeſs I was myſelf not a little miſtaken in two or three caſes at the firſt breaking out of this fever; one of them I took for a

true peripneumony, but the sore-throat, scarlet eruption, stench of the breath, and even petechiæ, very soon coming on, too plainly convinced me what was in truth the disease.

I have very often met with this buffy or sizy appearance of the blood in the beginning of malignant fevers, and yet blood, drawn two or three days after from the very same persons, hath been quite loose, dissolved, and sanious, as it were. Too many instances of this very lately occurred to me amongst the French captives here, who died by dozens of a contagious pestilential fever, very frequently attended with petechiæ and a bloody dysentery. In this fever (as well as all others) the French surgeons bled of course every day, or at least every other day. And I several times saw the blood of some of the officers (thus treated) a mere sanious gore on the third or fourth bleeding, though considerably sizy at the first. And yet so preposterous was their practice, that, at the same time they were so busy with the lancet, they gorged their patients with the strongest bouillon that beef, mutton, &c. could make, and this too though they were in a constant delirium, were covered with black or purple spots, and had their tongues as black as ink, and as dry and rough as a pumice-stone. I am very certain great numbers fell a sacrifice to this absurd practice.

This buffy appearance of the blood, at the very beginning of contagious pestilential fevers, doth not invalidate what I have said in my Essay on Fevers, of the effect of contagious effluvia on the blood in such fevers, but rather confirms it; for they tend to dissolve, and actually at length to destroy, the crasis of the blood, yet persons of a very viscid dense state of blood, may be seized with a contagious malignant fever, and the blood may appear very sizy and buffy on bleeding, at the very attack, but notwithstanding this, the action of the contagious ferment (if I may be allowed the expression) will more and more dissolve the blood, and at last render it a mere sanious putrilage, and so it will appear on subsequent bleedings. And therefore where there is just reason to fear a contagious malignity in a fever, we should proceed with the utmost caution as to repeated bleeding, especially as it will be constantly found that the pulse, as well as the strength, sink vastly after the second or third bleeding, and truly sometimes very surprisingly after the first.

But to return to my subject, whenever I was called to persons seized with this malady, at the very beginning I generally, instead of bleeding, ordered a clyster of milk, sugar, and salt, to be injected to unload the intestines, especially if the patient was costive. But when a purging attends the attack, a few grains of torrefied rhubarb, with species e scordio, decoct. alb. &c. are proper; and if the diarrhœa is profuse, a spoonful or two of decoct. fracastorii Fulleri may be frequently given, which is, in such cases, a very efficacious medicine.—If nausea and vomiting were urgent, I ordered a gentle emetic, especially for adults, which was so far from aggravating the pain of the throat, as might be imagined, that it generally greatly relieved it; nay, in children, it was often necessary to make them puke frequently with a little oxymel. scillit. essence of antimony, or the like, otherwise the vast amass of tenacious mucus would quite choak them.

I then immediately put the patient on a saline mixture of salt of wormwood, or volatile salt of hartshorn, and juice of lemon, with aq. alexeter. simpl. to which was added pulv. contrayerv. c. with a small quantity of myrrh and saffron; or these last were given in a bolus, with a few grains of nitre if the fever ran pretty high; the addition also of a grain or two of camphor, was very useful for the adult, where the stomach would bear it;

it; when it would not, I used julep e camphor. or acetum camphoratum, with syrup of black currants, rasberries, or the like. The second or third day, to the saline mixture, or a temperate cordial julep, I added some of my tinct.cort. peruvian. alexipharmic, which, at this time of the disease, I found greatly preferable to the bark in substance, as it much more tends to promote the eruption of the exanthemata, and doth not by far so much hinder the coming on of sweats, which at all times of this distemper are of the highest service, provided they are gentle, uniform, and universal. Indeed it was with great difficulty the sick could be brought to sweat at all, but whenever moderate equally-diffused sweats came on the third, fourth, or fifth day, or even later, they were critical and salutary, the urine grew immediately more concocted, and forthwith deposited a very large quantity of clay-coloured or pale lateritious sediment, though before crude, thin, or limpid; and therefore I always endeavoured to promote them by soft easy diaphoretics, and plentiful dilution with barley-water, thin whey, gruel, tea, or the like. I do not remember I had one patient miscarry, who fell into soft, easy, universal sweats, though the itching that sometimes came on with them, was almost intolerable, but generally the sweat soon abated the itching; at least it constantly lessened the fever, and the purging, if there was any, immediately ceased; the tumour of the neck, parotids, &c. subsided greatly also on the appearance of a kindly plentiful diaphoresis. The sweats were commonly very rank and fœtid, and that even in children.

I commonly gave elixir vitrioli with the tincture of the bark, except to very young children, which is an excellent anti-putrescent alexipharmic; and I frequently ordered the elixir to be taken out of an infusion of a roasted Seville-orange, in claret, or red-port wine and water, which is a very pleasant, and not an ineffectual composition.

There was an absolute necessity of washing out the mouth and fauces very frequently. The gargle I commonly ordered, was a decoction of figs, red rose-leaves, myrrh, and honey, in rough cyder, and a thin mucilage of quince-seeds, with syrup of rasberries, or black currants; and a little tincture of myrrh, *per se*, and spirit of vitriol, was to be taken by spoonfuls every now and then, especially after gargling. And I also directed the fumes of red rose-leaves, camomile-flowers, myrrh, and camphor, boiled in vinegar, to be drawn in with the breath very often, as hot as the patients could bear it, which gave very great and speedy relief.

Though the swelling of the neck, parotid glands, &c. would sometimes come on so sudden, great, and violent, as to endanger a suffocation, yet in general I took this external tumour to be partly critical, and therefore endeavoured to promote it by acrid cataplasms, blisters, &c. nay, I have several times blistered the throat from ear to ear, with great success. These applications are useful in common squifies, much more so in this, where the humours were so exceeding sharp and malignant.

As there was frequently a very great tension and tumour of the belly, and at the same time also some degree of a suppression of urine, an emollient fotus with some of the carminative seeds, or a few camomile-flowers boiled in milk and water, and a clyster of the same with salt and sugar, were necessary to promote the discharge of stool, wind, and urine, which gave immediate ease to the bowels, and withal, greatly facilitated the respiration, by giving a more free play to the diaphragm.—Indeed if the abdomen was very tense,

and the patient coſtive, about the fifth or ſixth day I generally gave a doſe of rhubarb, manna, or lenitive electuary, and after that, commonly the bark in ſubſtance; but I never ſo ordered it when the belly was very tumid and conſtipated, nor until ſome ſigns of coction, or a beginning deſquamation of the cuticle appeared; for I found my tincture, or a decoction of the bark, anſwer full as well, nay, better, as cauſing much leſs oppreſſion on the breaſt. I now alſo uſed a kind of reſin of the bark, made with ſpirits of wine, which I much prefer to the common extract, as it ſits much lighter on the ſtomach, and keeps much better; and therefore I think is more proper for an officinal medicine.

However improper purging might be at the beginning of this diſtemper, gentle eaſy cathartics, as rhubarb, manna, &c. were neceſſary at the end to carry off the putrid colluvies of the inteſtines, which otherwiſe protracted the feveriſh heats, and occaſioned great weakneſs, want of appetite, tumid bellies, and great obſtructions of the glands; nay, I was often obliged to give repeated doſes of calomel to carry off the ſwellings of the parotid and maxillary glands, which otherwiſe frequently remained a long time much ſwoln and indurated, and at length ſometimes ſuppurated. Indeed I ſeveral times found it neceſſary to rub them with a mercurial unguent before I could diſſolve the tumours; calomel was alſo farther uſed in deſtroying the worms, with which a vaſt number were at this time eſpecially troubled. But in general, after a purge or two, the ſick ſoon recovered a keen appetite, ſtrength, and ſpirits. Many, however, required frequent purging, a continuance of the bark, æthiops-mineral, &c. for a conſiderable time, and then a courſe of aſſes-milk, and an open country-air to prevent a waſting hectic, of which ſome died, eight or ten weeks after the diſeaſe firſt ſeized them.

This was undoubtedly a fever of the malignant peſtilential kind, in which the blood became highly acrimonious, diſſolved, and putreſcent. That it was very greatly contagious no one doubts, as it very often infected whole families, eſpecially the younger perſons. And that this contagion generated a very great degree of acrimony in the blood, is moſt evident from the hiſtory of the diſeaſe. I have elſewhere noted that contagion acts in the blood as acrimony. Perhaps the comtagious miaſmata are only the highly exalted ſalino-ſulphurcous particles and vapours that exhale from the diſeaſed infected body. It is well known the ſtench of putrid carcaſes, gangrened limbs, the polluted ſtinking air of jails, &c. deſtroy the craſis of the blood, and bring on malignant-peſtilential fevers; juſt as the putrid ſanies of a gangrened limb, abſorbed into the blood, brings on a fever of the ſame kind. It is certain the peſtilential effluvia in the true plague, bring on the moſt healthy, in a very few hours, a putrid diſſolution and gangrenous diſpoſition of the blood. And truly this malignant ſore-throat was in ſome caſes found very little inferior to it in virulence, not only the fauces, but the lungs, inteſtines, &c. having appeared gangrenous on diſſections, and the whole maſs of blood turned into a putrid gore. That an exceeding ſmall quantity of morbid matter will infect the whole maſs of blood, is moſt certain from the experiment of inoculating the ſmall-pox, in which it was found that very much leſs than a grain of the variolous matter, is fully ſufficient to bring on that diſtemper; nor is that ſurpriſing, when it is too well known what dreadful effects ariſe from the minuteſt quantity imaginable, of the virus of a viper, or mad dog.

Though this malignant-ulcerous ſquinſy ſeemed to be a diſeaſe *ſui generis*, yet it certainly had a very great reſemblance of the *febris anginoſa*, which

which I formerly described in my first volume *De Aere & Morbis Epidemicis*; and it is pretty remarkable, that such a kind of fever now also greatly prevailed up and down this part of the country; but indeed the anginose fever had very much more of an inflammatory nature than the malignant sore-throat now treated of, and the blood was commonly found much more dense and viscid in the former than in the latter, and of course would much better admit of bleeding. But in truth, it may be in this as in many other epidemic disorders, particularly the small-pox, measles, scarlet fever, &c. the general disease is greatly diversified by the particular constitution of the patients. Thus the variolous contagion, in one of strong elastic fibres and a very viscid dense blood, brings on a very high inflammatory fever. In another, of weak lax fibres and a loose dissolved blood, a low, putrid, nervous fever, not sufficient to protrude the pustules in a kindly manner, much less to bring them to a laudable maturation. In a word, the high inflammatory small-pox differ as much or more from the low malignant kind, as the febris anginosa from the pestilential-ulcerous sore-throat. How greatly doth the scarlet fever, described by Morton, differ from that mentioned by Sydenham! And indeed, although the same specific contagion always produces the same specific disease, yet it greatly differs in different persons, and is to be treated accordingly. There were certainly some of these ulcerous sore-throats, with a pretty smart fever, that bore bleeding at the beginning with advantage, and a much cooler regimen was necessary in some than in others; nay, I was obliged in several cases to give nitre with the diaphoretics. But I must confess, in general, much warmer medicines were necessary in this than in most other fevers; and that too sometimes when the heat was very considerable, otherwise the pulse would sink surprisingly, and an astonishing anxiety and oppression immediately succeeded. I have really been obliged to give such warm alexipharmics in this distemper (and that too many times to very young persons) as nothing but repeated experience could have induced me to order; as saffron, camphor, pulv. contrayerv. confect. cardiac. theriac. andromach. warm cyder, mulled wine and water, tinct. cortic. alexipharmic. &c. and this with a success that was well known, and justified the practice.

The word fever, as promiscuously used in the practice of physic, is not a little vague and undetermined.—There are some disorders that pass under that general name, which are best cured even by raising the fever, to instance only in some quartan agues, and low nervous fevers. And the malignant squinsy here described is another species of fever; which evidently proves, that all acute diseases are not to be treated merely with evacuations and cooling medicines. Proper dilution is unquestionably useful in all fevers; but certainly some require more than barley-water and lemonade. But I have already said several things on this head in my Essay on Fevers; and shall at present only add a word or two on the use of volatile alcalious salts in fevers of the putrid-pestilential or petechial kind; in which I fear they are too often very improperly administered.

And here I must observe, that, in all fevers of this nature, the blood is always found too much broken and dissolved, and at length becomes highly acrimonious, and as it were sanious and putrid. Whatever therefore tends to promote the acrimony and dissolution of the blood, must be very apt to bring on such fevers, and encrease their malignity when they happen; but volatile alcalious salts do both in an eminent degree; for though they may retard the putrefaction of the flesh of animals, and even in some measure of the blood, out of the body (and so will arsenic, or sublimate corrosive) yet, mixed with the blood,

blood whilst actually under the power of circulation and the vis vitæ, they certainly hasten its dissolution and consequent putrefaction. Even mixed with the blood out of the body, or rather as it runs from the vein, they quite destroy the texture of the blood-globules, nearly in the same manner as the poison of a viper, by dissolving the copula or cohesion of the component particles; and the blood of the most robust (nay even the most buffy blood of horses, as I have often tried) thus managed never concretes as usual into a solid crassamentum, and throws off its serum, but remains ever after a loose dissolved gore, or sanies.

Now let me farther observe, that when these volatile alcalious salts (or spirits) are taken in large quantities, and frequently, even by persons in health, they are well known to bring on feverish heats, hæmorrhages, spongy bleeding gums, stinking breath, rank urine, &c. symptoms that sufficiently indicate a beginning dissolution and putridity of the blood.

Moreover, these broken dissolved blood-globules are very apt to enter into the serous and lymphatic arteries, and there, not finding a free passage through their ramifications, stagnate and corrupt, and at length even corrode these exceeding tender vessels, particularly when saturated with acrimonious salts, which at the same time also greatly irritate these very minute canals, encrease the heat, and so cause a more speedy corruption both of the humours and vessels; and when the putrid lymph and serum is absorbed into the mass of blood, it greatly hastens the general corruption.

Volatile alcalious salts, even applied externally to the skin, very speedily corrode and ulcerate; and it is certainly fact, that given internally they heat vastly more, quantity for quantity, than the warmest vegetable alexipharmics; and that, I think, not so much by encreasing the projectile force and circulation of the blood, as by causing an intestine motion and effervescence in it; for, by the most accurate experiments, it is found, that solutions of the volatile alcaline salts weaken the tone of the fibres and power of the vessels, and consequently the momentum of the blood in the regular course of circulation. And we eventually find, that, when the blood abounds with very acrid salts, the pulse becomes weak, small, quick, and fluttering, as in the highly scorbutic, and that corrupt acrimonious state of blood which brings on the putrid fever, antecedent to some mortifications *ab interna causa*, as they call it; in both which the powers of nature sink greatly, and particularly the strength of the arterial vibrations, though they may encrease in quickness, to compensate for the want of that natural vigour and fulness which is observed in a free and firm pulsation of an artery duly filled with blood, and properly actuated. The extraordinary bigness and flaccidity of the heart that is commonly noted in scorbutic and pestilential cases, are owing to the weakness and great relaxation of its muscular fibres. That peculiar kind of biting heat, that we commonly feel on the skin of persons labouring under putrid-malignant fevers, seems to arise from the abundance of acrid salts and sulphurs in the blood and its intestine motion, and not from its encreased projectile force; for, on first touching the skin, the heat seems very little if at all above the natural, but, by continuing the finger a longer time on it, you are sensible of a disagreeable scalding in it, which sensation even remains in the finger for some small time after you have quite removed it from the sick person. This Dr. Pringle hath judiciously noted in his excellent Treatise on the Diseases of the Army; and Galen, as he candidly observes, long before him. This Monsieur Quesnoy calls *la chaleur d'acrimonie*, and very justly distinguishes it from *la chaleur d'inflammation*. The sensation, in truth, is as different as touching a very hot piece of dry wood, and dipping your finger into

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tepid ſpirit of hartshorn. And I think this obſervation evidently proves the abundance of acrimonious ſalts thrown off by perſpiration in theſe very putrid fevers. That peculiar burning heat alſo, which the ſick often feel within in ſuch diſeaſes, though the external parts of the body are actually cold, probably ariſes from the ſame cauſe. And I cannot but think the heat, obſervable in fevers preceding and attending mortifications *ab interna cauſa*, is generated by the acrimony and inteſtine motion of the humours; not certainly from a rapid projectile motion, for the pulſe is then always found weak and ſmall, though quick. The ſurpriſingly ſpeedy and great ſtench, ſwelling, and ſanious hæmorrhages from all the outlets, of the bodies of ſuch as die in putrid-malignant fevers, are arguments of the great inteſtine motion, rareſaction, and acrimony of the humours. This was the caſe commonly of thoſe that died of the malignant anginoſe fever above deſcribed. I have known the whole body ſwell vaſtly, even to the ends of the fingers and toes, with a cadaverous lividity, though almoſt quite cold, and an intolerable ſtench, even before the perſon was actually dead, blood iſſuing at the ſame time from the ears, noſe, mouth, and guts; and this too where the pulſe had been very weak and ſmall, though exceeding quick, from the very beginning. Was not this from much air generated in the blood by the inteſtine motion, heat, and putridity, which are well known to generate air? Is not the emphyſema, obſervable in ſome ſphacelations, from the ſame cauſe?

But to proceed, if we conſider the generation and nature of animal ſalts, perhaps we ſhall ſee a little farther into this matter. The ſtrongeſt vegetable acids we take in with our food, are by the vis vitæ ſoon changed into a neutral, or a kind of ammoniacal ſalts, and by being longer and longer expoſed to the action of the veſſels and heat of the blood, they more and more approach to an alcaline nature, and at length would become actually alcaline, were they not diluted, waſhed off, and corrected by aceſcent drink and diet. A perſon that lives on nothing but mere water and fleſh or fiſh, without any-thing either acid or aceſcent, ſoon contracts a very great rankneſs in all his humours; he grows feveriſh, and at length his blood grows into a ſtate of putrefaction.

The blood of thoſe that die of famine becomes highly acrimonious, which begets fever, phrenſy, and ſuch a degree of putrefaction as is utterly deſtructive of the vital principles. A very melancholy inſtance of which I once met with in a poor gentleman, who obſtinately ſtarved himſelf to death, and would not for many days, either by force or perſuaſion, ſwallow any kind of food, or a drop of liquor. He ſoon grew feveriſh, fluſhed in his face, and very hot in his head; his pulſe was ſmall, but very quick; in four or five days his breath became exceedingly offenſive; his lips dry, black, parched; his teeth and mouth foul, black, bloody; his urine (when it could be ſaved) vaſtly high-coloured and ſtinking, as much as if it had been kept a month; at length he trembled continually, could not ſtand, much leſs walk, raved and dozed alternately, fell into convulſive agonies frequently, in which he ſometimes ſweated pretty much about the head and breaſt, though his extremities were quite cold, pale, and ſhrivelled; the ſweat was of a very dark yellow colour, and of a moſt nauſeous ſtench.

It is certain alſo, that if the animal ſalts are not duly and conſtantly carried off by urine, they are highly deſtructive, as in iſchuries, for they continually advance more and more to an alcaline ſtate. It is not ſo much from an encreaſed quantity, as the acrimony of the juices, that an obſtinate ſuppreſſion of urine becomes fatal; for I have known it very ſoon fo-

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where the patient had very large discharges by sweat and stool, during the whole time of the suppression; particularly I remember, many years ago, a renal ischury fatal to a corpulent lady the eleventh day from the stoppage, though she was twice bled very largely, and kept purging the whole time, and consequently did not die from a redundance of humours. She made not a drop of urine from the time of her seizure to her death, though she took very largely of cantharides in substance and tincture, as well as many other medicines, particularly large doses of calomel. Indeed, although I have frequently known cantharides given with very good effect in ischuries, yet if they do not answer speedily, but are long continued in large quantities, I fear they co-operate with the acrid salts, and hasten the death of the patient, by bringing on a delirium and convulsions, as I have had the misfortune to see more than once.

But to the point in hand. The formation of volatile alcaline salts in the body, seems not much unlike the production of them out of the body. Let any kind of green plant, even the most acid, be pressed together in a large heap, it soon begins to heat, and gradually grows more and more hot, to such an intense degree at length, if the quantity be very large, as to break out into an actual flame, and this effervescence soon turns the whole mass putrid, and the acid and essential salts of the plant into volatile alcalies, which may be distilled from the putrid mass, and are in no respect essentially different from the volatile alcali salts raised from animal substances; both the one and the other are ultimately the effects of heat and motion on the salts of vegetables, and the longer and stronger these are acted upon by the force and heat of our solids and fluids, so much the more are they exalted to an alcaline state, in which they are absolutely unfit for the common uses of life; nay, exceedingly destructive, if they greatly abound, as in very putrid, pestilential, and petechial fevers, they unquestionably do; and therefore I think, in such cases, the exhibition of volatile alcalious salts to the sick, is adding fewel to the fire, for they certainly dissolve or break the globules of the blood, and thence more speedily bring on a general putrefaction. These salts, even applied externally to the skin, soon excite a gangrenous ulcer; and when the blood is largely stocked with them, it becomes a kind of firey lixivium, which is greatly destructive of the nervous fibrillæ, and ultima vascula. And this indeed would be more certainly, frequently, and speedily the case than it is, if the plentiful use of acids, diluents, and soft mucilaginous things, in drink and diet, did not prevent it by washing off and correcting them, as we see juice of lemon and vinegar quite take off their acrimony; indeed thus managed, they are, in many diseases, turned into very useful medicines.

Before I conclude, I beg leave to insert the following extraordinary case, as it is not altogether foreign to the purpose:

I had lately under my care, a gentleman of fortune and family, who so habituated himself to the use of vast quantities of the volatile salts that ladies commonly smell to, that at length he would eat them in a very astonishing manner, as other people eat sugared carraway-seeds. A Δριμυφαγεία with a vengeance!—The consequence soon was, that he brought on a hectic fever, vast hæmorrhages from the intestines, nose, and gums, every one of his teeth dropped out, and he could eat nothing solid; he wasted vastly in his flesh, and his muscles became as soft and flabby as those of a new-born infant, and broke out all over his body in pustules, which itched most intolerably, so that he scratched himself continually, and tore his skin with his nails in a very shocking manner; his urine was always

always excessively high coloured, turbid, and very fœtid. He was at last, with great difficulty, persuaded to leave this pernicious custom; but he had so effectually ruined his constitution, that though he rubbed on in a very miserable manner for several months, he died tabid, and in the highest degree of a marasmus; and I am persuaded he would have died much sooner, had he not constantly drank very freely of the most fine and generous wines, and daily used large quantities of asses-milk, and antiscorbutic juices well acidulated with juice of Seville-oranges, lemons, &c.

But after all, I am so far from thinking the volatile alcali-salts should be struck out of the materia medica, and condemning their use in all cases, that I am ve y certain they may be given with great advantage in very many. But, in truth, I still except those above-mentioned.

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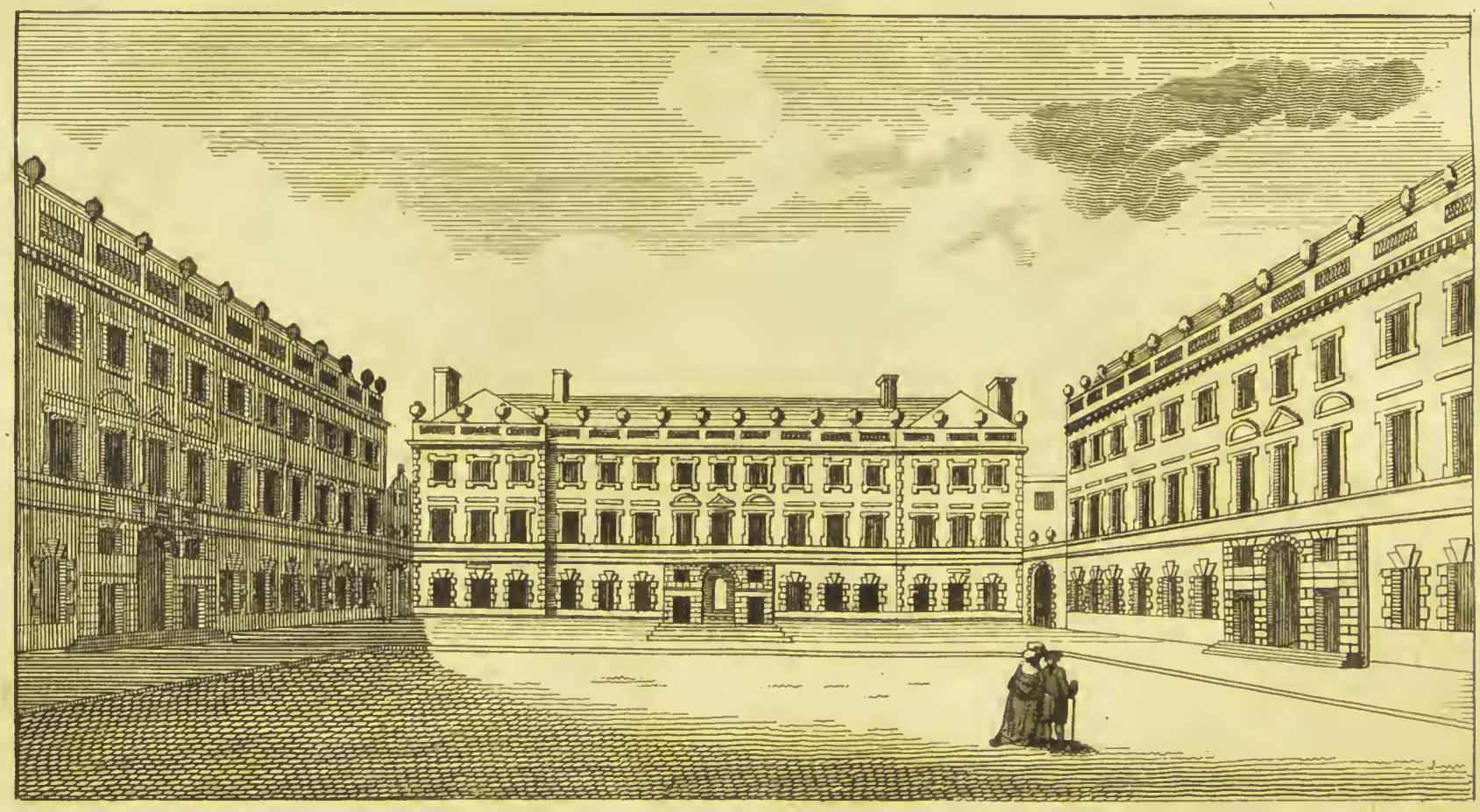

St. Bartholemew's Hospital.

THE

MODERN PRACTICE

OF THE

LONDON HOSPITALS:

VIZ.

St. BARTHOLOMEW's,	The PORTUGUESE,
St. THOMAS's,	AND
GUY's,	The LOCK,
St. GEORGE's,	At Hyde-Park Corner.

A NEW EDITION,

WITH AN

USEFUL INDEX OF DISEASES,

AND

THEIR REMEDIES.

LONDON:

PRINTED FOR G. LISTER, No. 46, OLD-BAILEY.

A TABLE OF DIET.

FULL DIET.

Sunday and Thursday

BREAKFAST. A pint of water-gruel.
Dinner. Half a pound of boiled beef, with greens.
Supper. A pint of broth.

Tuesday and Saturday.

Breakfast. A pint of water-gruel.
Dinner. Half a pound of boiled mutton, with greens.
Supper. A pint of broth.

Monday.

Breakfast. A pint of milk-pottage.
Dinner. A pint of rice-milk.
Supper. Two ounces of cheese or butter.

Wednesday.

Breakfast. A pint of milk-pottage.
Dinner. Half a pound of boiled pudding.
Supper. A pint of water-gruel.

Friday.

Breakfast. A pint of milk-pottage.
Dinner. A pint of plumb-broth.
Supper. Two ounces of cheese or butter.

The patients upon full diet shall have one loaf of bread per day.

Three pints of small-beer per day, from Lady-Day to Michaelmas.

One quart per day from Michaelmas to Lady-Day.

N. B. The loaf of bread weighs fourteen ounces.

LOW DIET.

Sunday.

BREAKFAST. A pint of water-gruel.
Dinner. Two ounces of roasted veal, with a slice of bread pudding.
Supper. A pint of broth.

Tuesday and Saturday.

Breakfast. A pint of water-gruel.
Dinner. Two ounces of boiled mutton, with greens, and a pint of broth.
Supper. A pint of broth.

Monday.

Breakfast. A pint of milk-pottage.
Dinner. A pint of rice-milk.
Supper. Two ounces of cheese or butter.

Wednesday.

Breakfast. A pint of milk-pottage.
Dinner. A slice of boiled pudding.
Supper. A pint of water-gruel.

Thursday.

Thurſday.

Breakfaſt. A pint of milk-pottage.
Dinner. Two ounces of roaſted veal, and a pint of rice-milk.
Supper. A pint of broth.

Friday.

Breakfaſt. A pint of milk-pottage.
Dinner. A pint of plumb-broth.
Supper. Two ounces of cheeſe or butter.

The patients uponlow diet, ſhall have one loaf of bread per day.

One quart of beer per day from Lady-day to Michaelmas. One pint per day from Michaelmas to Lady-day.

MILK DIET.

Sunday, Tueſday, Thurſday, and Saturday.

BREAKFAST. A pint of milk-pottage, or water-gruel.
Dinner. A pint of plumb-pottage, and four ounces of bread-pudding.
Supper. A pint of milk-pottage, or water-gruel.

Monday, Wedneſday, and Friday.

Breakfaſt. A pint of milk-pottage, or water-gruel.
Dinner. A pint of rice-milk.
Supper. A pint of milk-pottage, or water-gruel.

The patients upon milk diet, ſhall have one loaf of bread per day.

Three pints of drink per day; one pint whereof ſhall be milk, and two water.

The patients upon fiſh diet, ſhall have fiſh for dinner on Mondays, Wedneſdays, and Fridays, if it can conveniently be had; if not the low diet.

The patients upon dry diet, ſhall have two ounces of butter or cheeſe for breakfaſt, and the ſame for ſupper, every day in the week: and the low diet for dinner, but without broth or rice.

Milk on Tueſdays, Thurſdays, and Saturdays.

Bread and beer, as thoſe upon low diet.

The patients upon raiſin diet, ſhall have half a pound of raiſins per day, as much bread as they can eat, a quart of decoct. guaic. fort. and as much of the decoct. guaic. tenue, as they can drink.

The patients under ſalivation, ſhall have one quart of milk per day, and half a pound of mutton to be boiled for broth.

A TABLE,

A TABLE,

SHEWING

In what Proportion the ſeveral Purging Ingredients, Opium, and Mercury, are contained in thoſe compound Medicines in which they occur, with reſpect to the whole Compoſition.

COMPOUND powder of bole, with opium, in forty-five grains, —contains one grain of opium.

Compound powder of ſcammony, in ſeven grains—contains four grains of ſcammony.

Compound powder of ſena, in twenty-one grains—contains eight grains of ſena, eight grains of cream of tartar, two grains of ſcammony.

Componnd powder of amber, in forty grains—contains one grain of opium.

Scordium ſpecies with opium, in forty-five grains—contains one grain of opium.

The ſimple colocynth pill, in half a drachm troy—contains almoſt ten grains of ſcammony, and ten grains of colocynth.

The colocynth pill, with aloes, in half a drachm troy—contains almoſt eight grains of aloes, eight grains of ſcammony, four grains of colocynth.

The mercurial pill, in twenty-eight grains—contains fifteen grains of quickſilver.

The ſaponaceous pill, in ten grains, —contains almoſt a grain of opium.

The ſtorax pill, in five grains and 3-4ths—contains one grain of opium.

The ſcammony electuary, in a drachm and an half troy—contains fifteen grains of ſcammony.

The ſcordium electuary, in three drachms troy—contains a grain of opium.

The confection called paulina, in thirty-two grains—contains a grain of opium.

Mithridate, in half an ounce troy—contains a grain of opium.

Venice-treacle, in ſeventy-five grains—contains a grain of opium.

London philonium, in thirty-ſix grains—contains a grain of opium.

In the ammoniacum plaſter with mercury, the quickſilver is almoſt a fifth part of the whole.

In the common mercurial plaſter, the quickſilver is almoſt a fifth part of the whole.

In the ſtrong blue ointment, the quickſilver is almoſt a third part of the whole.

In the weaker blue ointment, the quickſilver is almoſt a fifth part of the whole.

In the mercurial cerate, the quickſilver is almoſt a fifth part of the whole.

THE PRACTICE OF THE LONDON HOSPITALS.

St. BARTHOLOMEW's HOSPITAL.

VINEGAR of ſquills, æthiops-mineral, ſimple alexiterial-water, ſpirituous alexiterial-water, lime-water, compound lime-water, ſimple pepper-mint-water, ſimple mint-water, ſimple penny-royal-water, ſpirituous penny-royal-water, nutmeg-water, vitriolic camphorated water; are all prepared according to the Diſpenſatory of the College of Phyſicians of London, as directed in the Supplement to this work.

Aluminous Bolus.

Take a ſcruple of conſerve of roſes, half a ſcruple of roch-alum, ſimple ſyrup, as much as is ſufficient to make a bolus, which is to be taken twice in a day. This is uſually given in caſes which require ſtrong aſtringents.

Guaicum Bolus.

Take half a drachm of gum guaicum powdered, a ſcruple of conſerve of roſes, and a ſufficient quantity of ſimple ſyrup to make a bolus, which is to be taken every morning. This is reckoned to promote inſenſible perſpiration greatly, and on that account is good in ſuch cutaneous diſorders as proceed from obſtructions of the perſpirable matter; in gouts and rheumatic complaints it is alſo very ſerviceable.

Stomachic Bolus.

Take powder of ginger, and powder of long pepper, of each fifteen grains; conſerve of orange-peel, a ſcruple; as much ſimple ſyrup as is ſufficient to make a bolus. This bolus is given three times in a day in all complaints ariſing from indigeſtion, for which it is an excellent remedy.

Rhubarb Bolus.

Take of toaſted rhubarb, fifteen grains; and half a drachm of the ſcordium electuary; mix them together. To be taken as often as occaſion requires. This is an efficacious remedy in looſeneſſes; the patient at the ſame time abſtaining from malt-

liquors, and making use of hartshorn drink, or the chalk decoction, for his common liquor.

Strengthening Bolus.

Take of yellow calophony, one scruple; of rhubarb, five grains; conserve of roses, half a scruple; simple syrup, a sufficient quantity to make a bolus. This is given twice in a day, in weaknesses and gleets of either sex.

Saponaceous Bolus.

Take of the best white soap half a drachm, oil of juniper five drops, simple syrup as much as is required to form a bolus, which is to be taken twice a day. This is very efficacious, not only in nephritic disorders, but also in the jaundice and asthma; in the most obstinate cases of which, this bolus is directed with the greatest certainty of success.

The saponaceous bolus with rhubarb, is made by adding ten grains of rhubarb to the foregoing bolus, and is directed for the same complaints when attended with costiveness.

Specific Bolus.

Take of calcined mercury one grain and an half, of London philonium a scruple; mix them together: to be taken every night going to rest. This is an excellent mercurial alterative, and very much promotes the cure of stubborn ulcers, as well as venereal complaints.

Turpentine Bolus.

Take of spirits of turpentine twenty-five drops, conserve of wormwood one scruple; mix them into a bolus. To be given in nephritic and sciatic disorders every night and morning; but should be cautiously administered.

Discutient Pultice.

Take of oatmeal and stale beer grounds, of each sufficient to make a pultice; which is to be applied in mortifications and bruises every night and morning; for which purposes it is far preferable to any other application.

Soponaceous Pultice.

Take of soap-leys three ounces, sweet oil half a pint, of warm water a gallon, of wheat flour a sufficient quantity to make the whole of a proper consistence. This is also an excellent discutient.

Cordial confection, conserves of wormwood, of orange-peels, of hips, and of red roses, are made exactly as directed in the Supplement.

White Decoction,

Is prepared by boiling two ounces of burnt hartshorn, and a quarter of an ounce of gum-arabic, in three pints of water, till there remains only a quart. This is prescribed for common drink in diarrhœas, and all fluxes of the belly.

Decoction of Marshmallows,

Is made by boiling two ounces of marshmallow roots in three pints of water till one pint has boiled away, then add two ounces of syrup of marshmallows, and drink half a pint three times in a day. It is usually directed to be taken at the same time with other medicines, in gravelly complaints, dysuries, &c.

Decoction of the Peruvian Bark.

Take four ounces of the best Peruvian bark, boil in eight pints of water till two quarts only remain. The dose two ounces three times in a day, in intermitting fevers, and other disorders proceeding from lax fibres.

Decoction of Oak Bark.

Take oak bark and pomegranate shells, of each four ounces; water and milk, of each a gallon; let one-half boil away; then strain and sweeten the remainder. To be taken, two ounces three times in a day, in every case where astringents are proper.

Pectoral

Pectoral Decoction,

Is prepared as directed in the Supplement, and is a good auxiliary remedy in diſorders of the breaſt.

Decoction of Sarſaparilla.

Take twelve ounces of ſarſaparilla, and ſix quarts of water, boil the water away to two quarts. Half a pint of this decoction, drank every ſix hours, has been found to relieve thoſe pains which frequently remain after a mercurial courſe, and makes an excellent diet-drink during the uſe of mercurials.

Decoction of Elm Bark.

Take of the freſh inner bark of the elm four ounces, and boil it in a ſufficient quantity of water, till there remains no more than a quart. This is directed to be taken as a vulnerary, the quantity of half a pint three times in a day. It is alſo ſometimes uſed as a gargle for ſore mouths, occaſioned by heat and ſharp humours.

Opening Electuary.

Take of lenitive electuary two pounds, cream of tartar four ounces, powder of jalap two ounces, oil of carraway-ſeeds a quarter of an ounce, ſyrup of roſes a ſufficient quantity to make an electuary. The doſe is the quantity of a nutmeg, and to be repeated as often as occaſion requires.

Aromatic Electuary.

Take ſix ounces of the aromatic ſpecies, conſerve of orange-peel one pound, and as much ſimple ſyrup as is ſufficient to make an electuary.

Aromatic Electuary, with Steel.

Take of the foregoing electuary half a pound, of prepared ſteel half an ounce; mix them together. The doſe of both theſe electuaries the quantity of a nutmeg three times a day. They are very warm, ſtrengthen the ſtomach, and are of very great ſervice in flatulencies ariſing from indigeſtion, as well as in complaints which ariſe from a languid circulation, and impoveriſhed ſtate of the blood.

Aſtringent Electuary.

Take of toaſted nutmeg and diaſcordium each four ounces, of prepared chalk one ounce, ſimple ſyrup a ſufficient quantity to form an electuary. A drachm of this electuary is given three times a day in diarrhœas, after proper evacuations.

Cinnabarine Electuary.

Take two pounds of vermilion, one pound of gum guaicum, half a pound of Venice ſoap, and as much ſimple ſyrup as is ſufficient to make an electuary. The doſe is the quantity of a nutmeg twice a day, in obſtinate rheumatiſms.

Electuary for the Piles.

Take lenitive electuary and flour of brimſtone, of each equal parts; mix them into an electuary with ſimple ſyrup. A drachm taken night and morning will keep the belly moderately lax, and greatly eaſe the piles.

Hydragogue Electuary.

Take gamboge two ounces, vitriolated tartar and powder of ginger of each half an ounce, oil of juniper two drachms, ſyrup of buckthorn a ſufficient quantity. The doſe is half a drachm twice a week, and is intended for dropſical patients, where they have ſtrength to undergo its operation.

Myrrh Electuary.

Take compound powder of myrrh a pound, a quarter of a pound of conſerve of wormwood, and make into an electuary with a ſufficient quantity of the ſimple ſyrup. The doſe two ſcruples three times in a day. This is preſcribed in diſorders of the female ſex, with ſucceſs.

Nephritic Electuary.

Take of lenitive electuary two ounces, juice of liquorice one ounce and

and an half, Venice turpentine half an ounce, powder of rhubarb two drachms, mix them into an electuary, a drachm of which is to be taken every morning. This gently purges, and is directed in all obstructions and foulnesses of the kidneys and ureters.

Cathartic Electuary.

Take powder of jalap one pound, one ounce of powder of ginger, and mix them into an electuary with syrup of buckthorn. Half a drachm of this electuary may be given twice in a week, in all cases where cathartics are required.

Specific Electuary.

Take one ounce of crude quicksilver, extinguish it in an ounce and an half of conserve of roses, add two drachms of powder of ginger, and a sufficient quantity of the simple syrup. The dose is half a drachm twice in a day, in all cases where mercurials are proper.

Tin Electuary.

Take prepared tin a pound, conserve of wormwood two ounces; mix into an electuary, with a sufficient quantity of the simple syrup. Half an ounce of this electuary is given every morning, as a certain specific against worms.

Elaterium, the paregoric elixir, acid elixir of vitriol, drawing plaster, common plaster, mercurial plaster, cephalic plaster, cummin-seed plaster, galbanum plaster, strengthening plaster, soap plaster, stomachic plaster, and blister plaster, are all prepared as directed in the Supplement.

Ischiatic Plaster.

Take Burgundy pitch four ounces, euphorbium one drachm, mix them together. This is a good plaster for the purpose its title expresses.

Anodyne Clyster.

Take two ounces of jelly of starch, one ounce of the styptic tincture, and two grains of extract of opium; mix them together. This is an excellent clyster in the bloody flux.

Common Clyster.

Take of fat mutton broth half a pint, of linseed oil three ounces, of common salt half an ounce; mix them for use.

Oily Clyster.

Take three ounces of sweet oil, and forty drops of liquid laudanum; mix them for use.

Turpentine Clyster.

Take half an ounce of Venice turpentine, mix it with a sufficient quantity of the yolk of an egg, and add thereto half a pint of fat broth. This clyster is generally prescribed in fits of the gravel and stone.

Purging extract, the extracts of campeachy wood, jalap, the bark, opium, and the common fomentation, are made as directed in the Supplement.

Emollient Fomentation.

Take mallow leaves, marshmallow leaves, and elder flowers, of each an handful; linseeds, fenugreek, and cummin-seeds, of each two ounces; boil them in a sufficient quantity of water till there remains only a quart; which strain for use. Its title expresses its virtues.

Poppy Fomentation.

Take two ounces of white poppy-heads, boil them in a quart of water to a pint. This is an excellent fomentation for painful wounds or ulcers.

Restringent Fomentation.

Take of oak bark an ounce and a half, of smiths' forge water three pints; boil them together to one quart, to which add a quarter of an ounce of roch-alum. A very powerful astringent.

Flores Martiales,

Are prepared as directed in the Supplement.

Common

Common Gargle.

Take a pint of barley-water, two ounces of white-wine vinegar, one ounce of honey of roses, and half an ounce of tincture of myrrh; mix them together for use.

Contrayerva Gargle.

Take one ounce of figs, half an ounce of contrayerva-root bruised, boil them in a sufficient quantity of water to strain off twelve ounces. It is sometimes made with the addition of an ounce of vinegar. This gargle is highly recommended by Dr. Fothergill, in the putrid sore-throat.

Palsey Gargle.

Take half an ounce of pellitory of Spain, boil it in a sufficient quantity of water to one pint, then add half an ounce of spirit of sal ammoniac.

Cordial Draught.

Dissolve half a drachm of the cordial confection in two ounces of the common julep: this draught is to be repeated every six hours, in cases where cordials are required.

Anodyne Draught.

Take of spring water an ounce and an half; spirituous alexiterial water, and syrup of white poppy-heads, of each two drachms; of liquid laudanum fifteen drops: to be taken every night going to rest.

Oily Draught.

Take sweet oil, and the common julep without syrup, of each one ounce; syrup of marshmallows, two drachms; powder of gum-arabic half a drachm; mix them together. One of these draughts to be taken three times in a day. Syrup of white poppy-heads is sometimes used instead of syrup of marshmallows.

Oily Draught with Manna,

Is made by adding three drachms of manna. These draughts are given in nephritic cases, and disorders of the breast. The simple bitter infusion, purging bitter infusion, and infusion of sena, are made as directed in the Supplement.

Laxative Infusion.

Take two ounces of the infusion of sena, three drachms of Glauber's salt, and half an ounce of solutive syrup of roses: to be taken twice in a week.

Infusion of Cascarilla.

Take of the bark of cascarilla one ounce, pour upon it a sufficient quantity of boiling water to strain off a pint: the dose, three ounces twice in a day. This is a very powerful expectorant.

Infusion of Mint.

Take an ounce of the dried leaves of mint, and pour on them a pint of boiling simple mint-water; when cold, strain off the liquor, and take a large spoonful every hour. This is an excellent stomachic, and is of great service in removing retchings to vomit, and in stopping fluxes of the belly.

Paralytic Infusion.

Take horse-radish sliced, and mustard-seed bruised, of each two ounces; boiling water a pint; let them infuse for twelve hours, in a vessel well stopped, and set in a warm place. To the strained liquor add two ounces of spirituous pepper-mint water.

Common Julep.

Take simple alexiterial water, and spring water, of each four ounces; brandy one ounce and an half; the simple syrup half an ounce.

Chalk Julep.

Take of the chalk-julep of the London Dispensatory, a pint; of nutmeg-water one ounce; mix them together. Three ounces of this julep are to be taken every six hours, in fluxes of the belly, the heart-burn, and other disorders proceeding from acidity.

Hydragogue

Hydragogue Julep.

Take of the common julep without ſyrup, ſix ounces; of tartar emetic ten grains; of ſyrup of buckthorn two ounces. The doſe a large ſpoonful every hour.

Mint Julep.

Take ſimple mint-water half a pint; conſerve of roſes one ounce; acid elixir of vitriol one drachm. This is an excellent ſtomachic. The doſe three large ſpoonfuls every ſix hours.

Reſtringent Julep.

Take of the common julep without ſyrup, a pint; of diaſcordium, ſix drachms; mix them together. The doſe, three large ſpoonfuls three times in a day.

Volatile Julep.

Take of ſalt of hartshorn, two drachms; of ſpring water, a pint; of ſpirituous alexiterial water, one ounce; and half an ounce of loaf ſugar. The doſe, four large ſpoonfuls, three times in a day.

Volatile Julep diluted,

Is made by adding to the former half a pint of ſpring water. Theſe are generally directed in rheumatic caſes, and in fevers where the pulſe is depreſſed.

Ammoniacum Milk.

The doſe two large ſpoonfuls, three times a day, in fits of the aſthma. It is prepared as directed in the Supplement.

Ammoniacum Milk, with Oil,

Is made by adding three ounces of ſweet oil to ſix ounces of the ammoniacum milk. Its uſe and doſe is the ſame as the former.

Common Linctus.

Take conſerve of hips ſix ounces, ſweet oil, and ſyrup of red poppies, of each one pint and an half; add a ſufficient quantity of ſpirit of vitriol, to make it agreeably tart. The doſe is a ſmall ſpoonful whenever the cough is troubleſome.

Common Linctus, with Syrup of White Poppy-Heads.

Take conſerve of hips ſix ounces, ſweet oil a pint and an half; ſyrups of red poppies, and of white poppy-heads, of each twelve ounces; ſpirit of vitriol a ſufficient quantity to make it agreeably tart. The doſe a ſmall ſpoonful when the cough is troubleſome.

Lohoch.

Take ſpermaceti, and conſerve of roſes, of each one ounce; of the pectoral ſyrup two ounces; to which may be ſometimes added half an ounce of myrrh, or three drachms of nitre. The doſe a tea-ſpoonful when the cough is troubleſome.

Lohoch, with Syrup of White Poppy-Heads.

Take ſpermaceti, conſerve of roſes, pectoral ſyrup, and ſyrup of white poppy-heads, of each one ounce. The doſe the ſame as the former. If a cough does not yield to theſe remedies in a few days, it will be to no purpoſe to rely on pectorals, eſpecially if it is attended with a fever, or proceeds from a pleuriſy, or peripneumony, for then it muſt be cured by plentiful bleeding and purging.

Oleaginous Liniment.

Take neats-foot oil a pint, Venice turpentine two ounces, Caſtile ſoap three drachms, mix them together for uſe.

The ſaponaceous liniment, and the volatile liniment, are both made as directed in the Supplement. Sometimes a fourth part of liquid laudanum is added to the volatile liniment.

Diuretic Lixivium.

Take ſalt of tartar and loaf ſugar, of each a pound; diſſolve them in a gallon

gallon of ſimple pepper-mint water; to which add a quarter of a pint of ſpirituous pepper-mint water. Two ounces of this lixivium are given three times in a day in dropſical habits; it is an attenuating and warm diuretic, which acts very powerfully.

Magneſia Alba,

Is recommended for children by Dr. Cadogan, in diſorders ariſing from acidities, inſtead of the common abſorbent powders, on account of their being apt to make the body coſtive.

Alkaliſed mercury, calcined mercury, calomel, honey of roſes, mithridate, are prepared as directed in the Supplement.

Ammoniacum Mixture.

Take twelve ounces of ammoniacum milk; ſyrup of ſquills four ounces. A large ſpoonful is to be taken when the ſhortneſs of breath is troubleſome.

Antimetic Mixture.

Take of the ſaline mixture half a pint, of liquid laudanum a drachm. The doſe two large ſpoonfuls every ſix hours.

Mixture for the Venereal Diſeaſe.

Take of corroſive ſublimate twelve grains, of brandy twenty-four ounces; let the mercury diſſolve of itſelf, and take a large ſpoonful twice in a day in water. This medicine has been uſed with ſucceſs in the military hoſpitals, but is rather uncertain in its effect, the quantity of mercury introduced into the conſtitution being ſo extremely ſmall. It is of excellent uſe in old ulcers, and in beginning cataracts.

Mixture to promote Expectoration.

Take of the infuſion of caſcarilla half a pint, of oxymel of ſquills one ounce. The doſe three large ſpoonfuls three times in a day; by adding four ounces of linſeed oil, it becomes the expectorating mixture with oil; by adding an ounce of the paregoric tincture, the anodyne expectorating mixture.

Hyſteric Mixture.

Take a pint of ammoniacum milk, and half an ounce of tincture of aſſafœtida. The doſe two ſpoonfuls as often as occaſion requires. This is a powerful remedy in hyſteric caſes.

Oil of Juniper Mixture.

Take oil of juniper one drachm, loaf-ſugar a quarter of an ounce, of the common julep half a pint. Two ſpoonfuls are to be taken when the hiccough is troubleſome. Sometimes forty drops of liquid laudanum are added to this mixture.

Olibanum Mixture.

Take gum olibanum one ounce; diſſolve it in a pint and an half of the common julep. Three large ſpoonfuls of this mixture are given twice in a day, in the ſame caſes for which the olibanum bolus is preſcribed.

The oily Mixture.

Take of the volatile julep diluted, twelve ounces, ſweet oil ſix ounces, ſpirit of ſal ammoniac one drachm, of of the ſimple ſyrup two ounces and an half. The doſe three large ſpoonfuls three times in a day.

Saline Mixture.

Take ſalt of tartar one ounce and a half, lemon juice eighteen ounces, ſpirituous alexiterial water half a pint, ſpring water a quart, loaf-ſugar three ounces. The doſe three large ſpoonfuls three times in a day.

Saline Mixture with Rhubarb,

Is made by adding ſix grains of rhubarb to every doſe. The ſaline mixture is very efficacious in removing vomitings, and is generally given for

for a few days in intermitting fevers, before the bark is administered.

Spermaceti Mixture.

Take two drachms of spermaceti, dissolve in the yolk of an egg six ounces of spring water, one ounce of spirituous alexiterial-water, and half an ounce of the simple syrup. The dose two spoonfuls when the cough is troublesome: sometimes two scruples of nitre, and sometimes syrup of white poppy-heads, instead of the simple syrup, are added to this mixture.

Purified nitre, oil of juniper-berries, oxymel of squills, and London philonium, are made as directed in the Supplement.

Anodyne Pill.

Take extract of opium one grain, Venetian soap five grains. This is a very safe opiate, and may be given every night going to rest, in all cases where opiates are required.

Strengthening Pills.

Take of rhubarb an ounce, of boiled turpentine three ounces, mix them together. The dose is a scruple twice in a day. These pills are of great service in the whites of women, and in stubborn gleets.

Ecphractic Pills,

Are prepared as directed in the Supplement. The dose is a scruple twice in a day. This composition is a powerful deobstruent, and is therefore of use in almost all chronic disorders from obstructions. They keep the body moderately open, and do great service in hypochondriacal as well as hysterical affections.

Assafœtida Pills.

Take assafœtida one pound, succotrine aloes four ounces, powder of ginger half a pound, and a sufficient quantity of simple syrup to make into a mass for pills. The dose is a scruple twice in a day. These are given in hysteric complaints.

Gum Pills and Mercurial Pills,

Are prepared as directed in the Supplement. The dose of each is a scruple twice in a day.

Purging Pills with Mercury.

Take of the purging extract a scruple, of calomel ten grains, syrup of buckthorn a sufficient quantity.—These are frequently prescribed in old ulcers, and are to be repeated twice in a week.

Squill Pills.

Take fresh squills, gum ammoniacum, and black pepper, of each an equal quantity; make twelve pills out of each drachm, two of which pills are to be taken twice in a day. There is scarce any medicine more effectual in asthmas, and they powerfully promote the urinary discharge.

Capivi Mixture.

Take three drachms of balsam of capivi, thirty drops of oil of juniper, a sufficient quantity of mucilage of gum arabic, six ounces of spring water, proof spirit and syrup of marshmallows, of each an ounce.—The dose two large spoonfuls three times in a day, in all disorders of the urinary passages; it is likewise a powerful balsamic, and good in most distempers of the breast.

Balsam of Peru Mixture.

Take of balsam of peru one scruple, of mucilage of gum-arabic a sufficient quantity, of the common julep one ounce and an half: to be taken twice in a day in nephritic complaints, inward ulcerations, and disorders of the breast.

Æthiopic Powder, with Rhubarb.

Take of æthiops-mineral a pound, rhubarb six ounces, ginger two ounces: the dose from ten grains to half a drachm, twice in a day: this may

may be given to young children for the worms, all crudities, and an acrimonious ſtate of the humours.

Compound Powder of Armenian Bole, with or without Opium.

Is prepared as directed in the Supplement.

Dr. Dover's Powder.

Take powdered opium, ipecacoanha, and liquorice powder, of each one ounce; purified nitre, and vitriolated tartar, of each four ounces; mix them well. The doſe is half a drachm every night going to reſt.

This powder is the noſtrum which Mr. Ward uſed in rheumatic diſorders with great ſucceſs. The ſweating ſhould be encouraged by lying between the blankets, and drinking plentifully of the ſaline mixture, as this powder occaſions great heat.

Compound Powder of Myrrh,

Is prepared as in the Supplement.

Pacific Powder.

Take half a ſcruple of rhubarb, and one grain of the extract of opium: to be taken every night going to reſt, in caſes where opiates are apt to render the body coſtive.

Purging Powder.

Take ſcammony, jalap, and ſena, of each equal parts. By adding a fourth part of calomel, is made the purging powder with mercury: the doſe is half a drachm three times in a week.

Sneezing Powder,

Is made as directed in the Supplement. This is preſcribed in the headach, giddineſs, deafneſs, and other diſorders of the head. It is generally adminiſtered at night going to reſt, and in the morning.

Worm Powder.

Take the flowers of tanſey and worm-ſeed, of each three drachms, ſalt of ſteel a drachm: the doſe is a ſcruple three times in a day. This is a very dangerous remedy againſt the diſorder its title expreſſes.

Salt of wormwood, ſalt of ſteel, ſalt of tartar, bitter purging ſalt, diuretic ſalt, volatile ſalt of hartshorn, volatile ſal ammoniac, and alum-whey, are made as directed in the Supplement.

Muſtard Whey.

Take milk and water, of each a pint, bruiſed muſtard-ſeed one ounce; boil them together till the whey is perfectly ſeparated from the curd.—The doſe is half a pint twice in a day: it is uſeful in aſthmatic, dropſical, and rheumatic caſes.

Sinapiſm.

Take muſtard-ſeed, and the crumb of a new loaf, of each equal parts; make into a pultice with a ſufficient quantity of the beſt vinegar. This is applied to paralytic members, and in fevers is ſometimes applied to the feet, by way of cauſing a revulſion from the head.

Aromatic Species.

Take winters-bark and ſweet-cane, of each two pounds; ginger, and long-pepper, of each one pound, mix them together.

Lavender-drops, ſpirit of ſal ammoniac, volatile ſpirit of aſſafœtida, oil of vitriol, ſyrups of marſhmallows, of white poppy-heads, of red poppies, of roſes ſolutive, ſimple, of ſquills, troches for the head-burn, and ſoluble tartar, are made as directed in the Supplement.

Tincture of Wood-Soot,

Is made as directed in the Supplement. The doſe is a quarter of an ounce in a glaſs of water, twice in a day, in hyſterical and nervous diſorders.

Tinctures of myrrh, of rhubarb

with wine, of rhubarb ſpirituous, of roſes, of hiera-picra, of ſnake-root, volatile, of guaiacum, and liquid laudanum, are prepared as directed in the Supplement.

Tincture of Sena.

Take of the leaves of ſena one pound, of Jamaica pepper two ounces, of proof-ſpirit a gallon, and half a pint of ſolutive ſyrup of roſes. The doſe two ounces in cholicky complaints, as often as occaſion may require.

Alcaline Aloetic Wine,

Is prepared as in the Supplement. Sixty drops of this, taken every morning, will do infinite ſervice in diſorders of the female ſex, and this medicine is alſo a good ſtomachic and alterative.

Ointments, ægyptiacum, white, camphorated, and of marſhmallows, are prepared as directed in the Supplement.

Blue Ointment.

Take hogs-lard and quickſilver, of each equal parts; turpentine a ſufficient quantity to extinguiſh the quickſilver entirely. This is the common mercurial ointment, which is uſed to raiſe a ſalivation by unction.

Yellow Ointment.

Take of quickſilver one ounce; of ſtrong ſpirit of nitre two ounces, digeſt in a ſand heat till the mercury is diſſolved; to which, while very hot, mix a pound of ſweet oil, and ſtir all well together, till the ointment is quite cold. This ointment is particularly efficacious in removing tetterous eruptions, and all diſorders of the ſkin.

Ointment for the Leproſy.

Take of the roots of ſharp-pointed dock four pounds, boil in eight pounds of mutton ſuet; ſtrongly preſs out the liquor, and add two pounds of tar, three pounds of ſweet oil, and half a pound of brimſtone; mix them together for uſe. An admirable ointment for the uſe its title expreſſes.

Tar ointment, ointment of elder, and ointment of brimſtone, with or without eſſence of lemons, are made as directed in the Supplement.

From the SURGEONS Books.

Eye Water.

TAKE half a drachm of white vitriol, and half a ſcruple of camphor, and pour on them ſix ounces of boiling water.

Another.

Diſſolve ten grains of white vitriol in an ounce of ſpring water. Either of theſe will very ſafely cool and repel thoſe ſharp humours which ſometimes affect the eyes, and will clear them of beginning films and ſpecks. If too ſharp, they may be farther diluted by the addition of a little ſpring water.

An epulotic Lotion, by Mr. Potts.

Take ſix drachms of white vitriol, and three drachms of camphor, and pour on them a quart of boiling water.

A digeſtive Balſam.

Take twelve ounces of oil of St. John's wort, and four ounces of Arceus's liniment, and mix them together. This is an excellent application for all kinds of green wounds, eſpecially when attended with great pain.

A reſtringent Bolus.

Take a ſcruple of rhubarb, four grains of ipecacoanha, and half a drachm of the London philonium.—This does amazing ſervice in fluxes of the belly, if taken every night going to reſt.

The

The emollient Powder.

Take marshmallows and mallow-leaves, each eight handfuls; camomile, melilot, and elder flowers, each four handfuls; linseeds and fenugreek seeds, each one pound, and grind them into a fine powder.

Mr. Nourse's anodyne Cataplasm.

Take one ounce of linseeds, and boil them in a quart of water to a pint, strain off the liquor, and dissolve in it two drachms of strained opium, then add twelve ounces of the emollient powder, and make the whole of a proper consistence for a pultice.—This is useful to assuage violent pains in any part of the body, particularly in disorders of the eyes.

The suppurative Cataplasm.

Take white lily roots, onions and figs, each one ounce; linseed flour one ounce; boil all together in a sufficient quantity of water, and when they are boiled tender, add an ounce of Burgundy pitch. An excellent suppurant.

The astringent Cataplasm.

Take bean flour and barley meal, each three ounces; Cypress nuts, balaustines and roch alum, each one ounce; red-rose leaves six drachms oil of roses three ounces, the whites of two eggs, and a sufficient quantity of vinegar to give the whole a proper consistence.

The Mustard Pultice.

Take flour of mustard and oatmeal, of each equal parts; and a sufficient quantity of vinegar to give a proper consistence. It has been customary to apply these kinds of acrid medicines to the soles of the feet, with a view of making a revulsion from the head; the service which these irritating applications are of where the head is affected, can arise only from their impressing a stimulus; which, though at first partial, by degrees becomes universal.

The ophthalmic Pultice.

Take half a pint of the alum curd, and mix therewith a sufficient quantity of red-rose leaves powdered, to give it a proper consistence. This is an useful astringent application for sore moist eyes, and excellently cools and represses their defluxions.

Another ophthalmic Pultice.

Take half a pint of linseed mucilage, and as much flour of linseed as is requisite to make it of a proper consistence. This pultice lies as soft as that of white bread and milk upon inflamed eyes, and is far preferable, in as much as the latter is apt to become sour and acrid; inconveniencies from which this is free.

The Bougie.

Take three drachms of quicksilver and two drachms of lead, make an amalgama; then add an ounce of crude antimony in fine powder, and one pound of melted bees-wax.

Another.

Take a pound of yellow bees-wax, of turpentine four ounces, cinnabar of antimony one ounce, mix them together. Bougies are of service in disorders of the urethra, by distending the part as well as procuring a suppuration. The properties therefore requisite in a bougie, are a sufficient degree of firmness, that it may be introduced with some force; a suppleness and tenacity that it may conform to the motions of the body, without breaking; a lenient suppurative disposition to bring on a discharge without pain; and lastly, a smoothness of surface, that it may not only be introduced with more ease, but that it might lie easy in the passage till it begins to dissolve.

Green Cerate.

Take diapalma plaster, and ointment of elder, each equal parts, and melt them together.

Yellow Cerate.

Take three pints of linseed oil, two pounds of yellow wax, and melt the wax in the oil.

Common Cerate.

Take two pints of the common plaster and unguentum nutritum, and one part of black basilicon, and melt them together.

Saponaceous Cerate.

Take a pound of litharge in fine powder, a gallon of the sharpest vinegar, half a pound of Castile soap, ten ounces of wax, a pint of olive oil. Dissolve two ounces of the soap in a quart of the vinegar, mix with the litharge, and evaporate the vinegar over a gentle fire; then add the same quantity of soap and vinegar, and evaporate again, till the whole of the vinegar is evaporated. Repeat this four times, then add the oil and wax, and shake them well together till they are thoroughly melted, then remove the mixture from the fire, and when cold, it will have the consistence of a cerate.

This is contrived for the purpose of a discutient, and seems, by its subtilty, to be able to carry almost any thing off through the pores of the skin.

Sky-coloured Collyrium.

Take half a pint of lime-water, and half a drachm of crude sal ammoniac, and let them stand together twelve hours in a copper vessel. This is useful in most disorders of the eyes, particularly in specks and films thereof.

Specific Electuary.

Take an ounce of quicksilver, an ounce and an half of conserve of red-roses, half an ounce of the simple syrup, rub them together in a marble mortar, till the globules of the quicksilver entirely disappear.

Another specific Electuary.

Take lenitive electuary, and alkalised mercury, each an ounce; gum olibanum half an ounce, balsam of copaiva, and syrup of roses, each half an ounce, mix them together.—The dose of either of these electuaries is the quantity of a nutmeg every night and morning. They are usually given in complaints arising from a venereal cause.

Sticking Plaster.

Dissolve two ounces of isinglass in a pint of brandy, or melasses spirits, and add one ounce of tincture of Benjamin. This is the original receipt for preparing the ladies' black sticking plaster.

Ophthalmic Epithem.

Take one ounce of alum in fine powder, the white of an egg, of Armenian bole, and conserve of roses, each six drachms, mix them together. A powerful restringent, and proper in all disorders of the eyes, arising from relaxation.

Discutient Liniment.

Take three drachms of opodeldoc, two ounces of oil of earthworms, and a few drops of the oil of origanum and lavender.

Another Discutient Liniment.

Take half an ounce of Barbadoes tar, half a drachm of oil of origanum, half a drachm of volatile spirit of sal ammoniac, compound spirit of lavender a drachm, powder of euphorbium half a drachm. These are useful in paralytic complaints, being rubbed on the part affected till the part changes colour and looks red.

The Ophthalmic Fomentation.

Take six drachms of white poppy-heads bruised, with their seeds, and boil them in milk and water, each half a pint, till one half is consumed away; then dissolve in the strained liquor a drachm

drachm of white vitriol, and a ſcruple of ſugar of lead.

An Aſtringent Fomentation.

Take oak bark and pomegranate-ſhells each an ounce, balauſtine flowers half an ounce, red roſe-leaves an handful, boil them in four red-wine and lime-water equal parts of each.

The Detergent and Aſtringent Gargle.

Take a pint of the decoction of oak bark, two ounces of rectified ſpirit of wine, one ounce of tincture of myrrh, mix them together. This was uſed very ſucceſsfully to waſh the mouth with ten or twelve times a day, after removing a large fungus from the under jaw.

The Expreſſion of Millepedes.

Take four ounces of live millepedes, and bruiſe them in a marble mortar with a pint and an half of the common julep; then ſqueeze out the liquor and take two ounces, with two drachms of ſal polychreſt, and a drachm of honey, twice in a day. This is of ſervice in the jaundice, and almoſt all chronic diſorders which foul the glands.

The Injection for the Fluor Albus.

Take two drachms of ſugar of lead, an ounce and an half of the ſcordium electuary, and a quart of lime-water.

An Injection for a Gleet in Men.

Take half a pint of lime-water, a drachm of the ſcordium electuary, and eight grains of ſugar of lead.

A Lotion for the Itch.

Take half a drachm of mercury ſublimate, and three drachms of white vitriol, diſſolve them in a pint of warm water: and with this lotion waſh the parts affected two or three times a day.

The Diſcutient Mixture, or Minderer-rus's Spirit.

Take as much of crude ſal ammoniac as is ſufficient to thoroughly ſaturate a quart of the beſt white-wine vinegar, and mix them together. This is a moſt admirable diſcutient. It diſperſed a tumour in a girl's knee, which appeared from the fluctuation to contain at leaſt an ounce of a glairy fluid.

An Æthiopic Pill.

Take quickſilver, and golden ſulphur of antimony, each four ounces; gum guaicum two ounces; mix them well together in a marble mortar; and then add four ounces of Caſtile ſoap, and a ſufficient quantity of the balſamic ſyrup to give it a proper conſiſtence. Theſe pills reſemble thoſe of Dr. Plumber, deſcribed in the Medical Eſſays, to which they are preferable in one reſpect, they are leſs apt to run off by ſtool. This medicine is an excellent alterative in cutaneous and venereal diſorders; three or four middle-ſized pills are to be taken every night and morning, the patient keeping moderately warm during the whole time that this courſe is continued.

A Mercurial Pill. P. P.

Take two ounces of quickſilver, thirty drops of ſpirits of turpentine, half an ounce of ſyrup of buckthorn, and as much liquorice powder as is neceſſary to give it a proper conſiſtence. The doſe is from ten grains to half a drachm every night going to reſt.

Another.

Take quickſilver ſeven grains, turbith mineral one grain, extract of opium barely a grain, and mix into a pill with the ſimple ſyrup, which is to be taken every night going to reſt.

Another. Ed. N.

Take quickſilver, ſyrup of buckthorn, and clarified honey, each one ounce; powder of jalap ten drachms; rub

rub the ſyrup and quickſilver together till the globules entirely diſappear; then add the jalap and honey, and make ſix pills out of each drachm. The doſe is one pill every night going to reſt.

All theſe mercurial pills are capable of doing great ſervice in the venereal and chronic diſorders. Belloſte's pills are ſomewhat ſimilar to theſe laſt, if the analyſis which has been made of them is juſt.

Reſtringent Pill.

Take of the Peruvian bark in fine powder, and gum olibanum, each half an ounce; rhubarb two drachms; and make them into pills with Straſbourg turpentine. Theſe are good in all weakneſſes of the reins, and will be of great ſervice in the whites, and gonorrhœas, after the virulence is removed. Three or four pills are a proper doſe every night and morning.

Olibanum Pill.

Take gum olibanum and alkaliſed mercury each half an ounce; powder of rhubarb two drachms, ſyrup of roſes ſolutive as much as is neceſſary to give a proper conſiſtence, and divide the maſs into pills of a middling ſize; two or three of which may be taken twice in a day, in gleets or weakneſſes of either ſex, where there is a ſuſpicion the virulence is not entirely removed.

Aſtringent Drink.

Take pomegranate ſhells, balaugine flowers, and red-roſe leaves, each two drachms, boil in two quarts of water, till one half is waſted away: to the reſtrained liquor add a quart of new milk, and uſe it for common drink.

Cauſtic Powder.

Boil a pint of ſoap leys to one half, and add ſeven ounces of quick lime in fine powder; mix them together, and keep the powder in a glaſs bottle, well ſtopped from the air.

This, mixed with ſoft ſoap, is the cauſtic uſually made uſe of to open abſceſſes, &c.

Epulotic Powder.

Take prepared calamine, and powder of myrrh, each equal parts, and mix them together.

Tooth Powder.

Take myrrh, roch alum, dragons blood, and cream of tartar, each half an ounce, and make them into a very fine powder: this, though ſimple, is an excellent dentrifice; but nothing of this kind ſhould be applied too frequently to the teeth, for fear of hurting their enamel.

Sarſaparilla Bolus.

Take half a drachm of ſarſaparilla in fine powder, half a ſcruple of gum guaiacum, a ſcruple of gum arabic, and as much balſam capivi as is ſufficient to give it the conſiſtence of a bolus. This is frequently ordered by Mr. P. P. to be taken every morning in a gleet remaining after a ſalivation.

A ſucceſſful Method of Cure in the Dead Palſy, by J. F.

Take an ounce of tincture of hiera picra, half a drachm of ſpirits of turpentine, and ſix drachms of ſyrup of buckthorn; mix them into a draught—to be taken every night going to reſt.

Take ſpirits of turpentine and oil of origanum, each one ounce; oil of amber two drachms, ointment of marſhmallows two ounces; mix them into a liniment: to be rubbed on the part affected, as occaſion may require.

Paralytic Tincture.

Take of the Peruvian bark, and valerian root, each half an ounce; ſpirits of ſal volatile five ounces; let them digeſt together for four days, in a glaſs veſſel cloſely ſtopped, then ſtrain off the tincture. The doſe is from

from half a drachm to a drachm, three times in a day, in a glaſs of water; it is an excellent medicine in all nervous and cephalic diſorders.

Tincture of Myrrh.

Take myrrh, ſuccotrine aloes, dragons-blood, ſarcocol, olibanum, each half an ounce; euphorbium powder three drachms; digeſt them for three weeks, in three pints of brandy or molaſſes ſpirits: this tincture is contrived principally for chirurgical uſes.

Yellow Baſilicon.

Take yellow roſin, bees-wax, and mutton ſuet, each half a pound; linſeed oil ten ounces, Venice turpentine three ounces; melt all the ingredients together, except the turpentine, and when they are all melted, take it off the fire, add the turpentine, and keep ſtirring it till the ointment is quite cold.

Another, by P. P.

Take bees-wax and mutton ſuet, each half a pound; linſeed oil a pint, Venice turpentine four ounces; melt them together, and ſtir the ingredients till the ointment is quite cold.

Tar Ointment.

Take Barbadoes tar and mutton ſuet, equal parts of each, and melt them together: this is uſed as a plaſter for children's ſcaled heads; but care muſt be taken to give proper medicines internally, during the uſe of this external application.

Another.

Take tar, and the yellow mercurial ointment, each equal parts; mix them together: this is uſed for the ſame purpoſes as the former, and requires the ſame caution.

Ophthalmic Ointment.

Take prepared tutty and lapis calaminaris, each a drachm, camphor a ſcruple, white vitriol half a drachm; ointment of elder two ounces: this receipt is taken from the experience of a very eminent perſon, who uſed it many years with great ſucceſs in diſorders of the eyes.

Lead Ointment.

Take calomel finely levigated, two drachms, freſh lime-water half a pint; let them ſtand together for two days, then ſtrain off the liquor, and keep the powder.

Take of this powder, and black lead levigated, each two ſcruples, and mix with an ounce of ointment of elder flowers.

This application was once made uſe of in a *noli me tangere*, when it ſucceeded happily; many things had been tried before, but met with no ſucceſs.

It alſo once cured a very bad cutaneous diſorder of the ſcorbutic leprous kind, which was ſpread over both arms in great blotches.

The following method cured a girl of a contraction of the muſcles in the calf of her left leg, under which ſhe laboured ſome months, and by means whereof her foot was drawn quite inwards, ſo that ſhe could not put it to the ground.

A bliſter was applied to the calf of the left leg.

A vomit of half a drachm of ipecacoanha, was adminiſtered twice a week.

Half a drachm of valerian was given every ſix hours.

The warm bath was uſed twice in a week.

In ſcrophulous tumours of the glands the following method bids faireſt to effect a cure:

Take crude antimony in fine powder, and burnt ſponge, each a ſcruple; calomel prepared, a grain; mix them together: to be taken every night

night and morning, drinking half a pint of ſea-water aftereach doſe.

But to ſay the truth, the ſucceſs depends chiefly on the ſea-water, which ſucceeds as well when uſed ſingly.

ST. THOMAS'S HOSPITAL.

Vinegar of Squills.

DOSE from twenty to ſixty drops twice a day.

Antimonial Æthiops.

Take of crude antimony and quickſilver, of each one ounce; flour of brimſtone half an ounce; mix them well together: the doſe is a ſcruple twice in a day. This is an admirable medicine, much preferable to the æthiops of the ſhops, and of great efficacy in all cutaneous diſorders.

Æthiops Mineral

Is prepared according to the Supplement.—Its doſe is a ſcruple twice in a day.

Vegetable Æthiops.

Take of the quercus marinus calcined, a drachm twice in a day.—Many ſurpriſing cures have been effected in ſcrophulous caſes by means of this æthiops.

Alum-water, and ſimple Lime-water,

Are prepared as directed in the Supplement, and are uſed for the ſame purpoſes.

Barley-water, ſimple alexiterial, ſimple cinnamon, ſimple pepper-mint, ſimple common mint, ſimple penny-royal, and roſe-water, are prepared as directed in the Supplement.

Spirituous alexiterial-water, ſpirituous alexiterial-water with vinegar, ſpirituous water of orange-peel, ſpirituous water of juniper, ſpirituous water of common mint, ſpirituous water of nutmeg, ſpirituous water of carraways, are prepared as directed in the Supplement.

Barley-water, with Gum-Arabic,

Is prepared by diſſolving an ounce and an half of gum-arabic in a quart of barley-water, to be taken a quarter of a pint three times in a day: this is to be uſed as common drink in gravelly complaints.

Barley-water with Nitre.

Diſſolve a quarter of an ounce of nitre in a quart of barley-water: the doſe four ounces three times in a day: it is uſed in all diſorders of the urinary paſſages.

Lambeth-Wells Water.

The doſe is half a pint three times in a day.

Aqua Liberans.

Take of the ſhavings of ſaſſafras four ounces, guaiacum one ounce, liquorice-root two ounces, coriander-ſeeds bruiſed one ounce, infuſe them in one gallon of lime-water: the doſe ſix ounces twice in a day: this is good in all caſes that require abſorbents and ſweeteners, eſpecially in venereal affections, after ſalivation.

From four ounces to a pint of ſea-water,

water, may be taken every morning in ſcrophulous caſes.

Purging-water with Manna.

Boil two quarts of Sydenham-Wells water to one quart, and diſſolve therein one ounce of manna; to be taken in the morning early, and repeated as often as occaſion may require, in caſes where cooling phyſic is proper.

Waters, ſapphire coloured, ſulphurated, vitriolic, camphorated, blue, are prepared according to the Supplement.

Balſams of Lucatellus, and of ſulphur, are prepared according to the Supplement.

Alexiterial Bolus.

Take of the alexiterial powder twenty-four grains, ſimple ſyrup a ſufficient quantity to make into a bolus: this is frequently directed to be taken to promote a diaphoreſis, after any operation which is attended with great pain, and in feveriſh diſorders; and is to be repeated every ſix hours, drinking after each bolus a few ſpoonfuls of the common julep.

Alexiterial and Epileptic Bolus.

Take of the alexiterial and epileptic bolus, of each a drachm, mix them together: to be taken every ſix hours.

Alexiterial Bolus, with Caſtor.

Take of the alexiterial bolus one drachm, of Ruſſia-caſtor ſix grains, mix them together: to be taken every ſix hours in nervous fevers.

Alexiterial Bolus, with the Cordial Confection.

Take of the alexiterial bolus one drachm, of the cordial confection half a ſcruple, mix them together: to be taken every ſix hours, to promote a diſcharge by the ſkin.

Alexiterial Bolus, with Nitre.

Take of the alexiterial bolus one drachm, of purified nitre eight grains, mix them together; to be taken every ſix hours: this is leſs heating than the foregoing.

Alterative Bolus.

Take of gum guaiacum half a ſcruple, æthiops-mineral half a drachm, lenitive electuary one drachm, ſimple ſyrup a ſufficient quantity; mix them together: to be taken twice in a day: this is a moſt efficacious preſcription in all foulneſs of blood whatever.

Aluminous Bolus.

Take conſerve of roſes one ſcruple, alum half a ſcruple, ſimple ſyrup a ſufficient quantity: this is very aſtringent, and is directed to be taken twice a day, in obſtinate fluxes.

Antimonial Bolus.

Take of the æthiops-mineral and crude antimony, a ſcruple each; conſerve of elder half a ſcruple, ſimple ſyrup a ſufficient quantity: this is to be taken twice in a day. *Vide* Antimonial Æthiops, for its virtues.

Antimonial Bolus, with the Aromatic Species,

Is made by adding four grains of the aromatic ſpecies to the foregoing bolus. Its doſe is the ſame, and is uſed for the ſame intentions as the antimonial æthiops.

Aromatic Bolus.

Take of toaſted nutmeg, electuary of bole armenic with opium, each four ounces; chalk prepared one ounce, ſimple ſyrup a ſufficient quantity, mix them together: a drachm of this bolus is directed to be taken three times in a day, with a draught of the white drink, in diarrhœas, after a few doſes of rhubarb have been previouſly given.

Bolus for the Gout.

Take of the beſt honey three ounces, ſpirit of turpentine two ounces, mix them together; the doſe is a drachm twice in a day: this is of great efficacy in the ſciatica, or hip gout; but the uſe of ſpirit of turpentine requires caution.

Aſtringent Bolus.

Take of conſerve of roſes twelve ounces, Japan earth three ounces, elixir of vitriol and alum, of each an ounce; ſyrup of red poppies a ſufficient quantity, mix them together: this is a powerful aſtringent, and is given a drachm three times a day, in obſtinate fluxes, and relaxed ſtate of the bowels.

Balſamic Bolus.

Take Lucatellus's balſam one ounce, conſerve of roſes two ounces, ſyrup of red poppies a ſufficient quantity: this is given in diſtempers of the breaſt and lungs, and in all ſuſpicions of inward ulcerations, as alſo upon any accidental bruiſes; the quantity of a drachm three times in a day, with a draught of the pectoral decoction after each doſe.

Balſamic Bolus, with Balſam of Sulphur.

Take of the balſamic bolus ſix ounces, balſam of ſulphur one ounce, mix them together: the doſe of this is the ſame as the former, and is uſed for the ſame purpoſes.

Calomel Bolus.

Take of calomel ten grains, conſerve of roſes half a drachm, mix them together: this is given over night twice in a week, to be carried off by the common purging draught, in any caſes that require briſk purging.

Steel Bolus.

Take of conſerve of wormwood twenty-four grains, powder of ſteel twelve grains, ginger and winter's bark, of each three grains; ſimple ſyrup a ſufficient quantity: this is directed in a chloroſis, and all menſtrual obſtructions; likewiſe in all decays of the conſtitution from chronic diſeaſes. It is to be taken twice in a day, uſing as much exerciſe as is conſiſtent with the condition of the patient.

Camomile Bolus.

Take of the camomile flowers half a drachm, ſimple ſyrup a ſufficient quantity; to be taken three times in a day: this is given to ſtrengthen the ſtomach, in the heart-burn, and in agues.

Compound Camomile Bolus.

Take of camomile flowers half a drachm, alum and myrrh, of each five grains; ſimple ſyrup a ſufficient quantity. Its doſe is the ſame as the former, and they are both ſometimes given in intermitting fevers.

Copaiva Bolus.

Take lenitive electuary, and balſam of copaiva, of each one ounce; powder of rhubarb three drachms, mix them together. A drachm may be given twice a day with ſucceſs, in gleets remaining after a ſalivation, and to complete the cure in venereal gonorrhœas, after the virulence is removed.

Strengthening Bolus.

Take of yellow colophony a ſcruple; rhubarb and conſerve of roſes, of each ten grains; ſimple ſyrup a ſufficient quantity: to be taken twice in a day.

Cleanſing Bolus.

Take of gum guaiacum and loaf ſugar, each half a ſcruple; flour of brimſtone two ſcruples, ſimple ſyrup a ſufficient quantity: to be taken twice in a day, in diſorders of the ſkin, or rheumatic caſes.

Bolus for the Diarrhœa.

Take of rhubarb fifteen grains, electuary of Armenian bole with opium half a drachm, ſimple ſyrup a ſufficient quantity: this may be given in all fluxes of the belly that require to be ſtopped as often as the urgency of the ſymptoms indicate: but it is generally directed only at night going to reſt.

Epileptic Bolus.

Take two ounces of the powder of valerian, ſimple ſyrup ſix ounces, mix them together: the doſe is a quarter of an ounce twice in a day. It is a good medicine in nervous or paralytic diſorders.

Epileptic Bolus, with Powder of Steel.

Take of the epileptic bolus a quarter of an ounce, powder of ſteel ten grains: this is to be taken twice in a day in epileptic complaints, accompanied with an obſtruction of the menſtrual diſcharge.

Epileptic Bolus, with Nitre.

Take of the epileptic bole a quarter of an ounce, purified nitre ten grains; to be taken twice in a day, where epileptic complaints are attended with feveriſh ſymptoms.

Epileptic Bolus, with Sal Ammoniac.

Take of the epileptic bole a quarter of an ounce, ſal ammoniac five grains: to be taken twice in a day.

Febrifuge Bolus.

Take powder of the Peruvian bark two ounces, ſimple ſyrup ſix ounces, mix them together: the doſe is a quarter of an ounce every two hours in intermitting fevers.

Febrifuge Bolus, with Alum.

Take of the febrifuge bolus a quarter of an ounce, alum ten grains: to be taken every ſix hours, in obſtinate agues.

Febrifuge Bolus, with Myrrh.

Take of the febrifuge bolus a quarter of an ounce, myrrh ten grains: to be taken every ſix hours in the ſame caſes.

Febrifuge Bolus, with Sal Ammoniac.

Take of the febrifuge bolus a quarter of an ounce, ſal ammoniac three grains: to be taken every ſix hours, in the ſame caſes.

Febrifuge Bolus, with Salt of Steel.

Take of the febrifuge bolus a quarter of an ounce, ſalt of ſteel three grains: to be taken every ſix hours in intermitting fevers, attended with an obſtruction of the menſtrual diſcharge.

Bolus for a Gonorrhœa.

Take of powdered jalap three ounces, liquorice powder and ſcammony, each one ounce; Venice turpentine ten ounces, mix them together: the doſe is a drachm every morning: this is a briſk purge, and is directed in a gonorrhœa, to be taken till the matter becomes well coloured, when it is left off for things more ſtrengthening.

Guaiacum Bolus.

Take of the gum guaiacum and conſerve of elder, each half a drachm; ſimple ſyrup a ſufficient quantity: to be taken every morning in rheumatic diſorders.

Guaiacum and Arthritic Bolus.

Take of the guaiacum bolus one drachm, of the arthritic bolus half a drachm, mix them together: to be taken every morning in rheumatic and gouty complaints.

Bolus for the Piles.

Take of the lenitive electuary, and flour of brimſtone, each half a drachm; ſolutive ſyrup of roſes, a ſufficient quantity;

quantity; to be taken twice in a day: this is very good for what the title expresses, especially where persons are subject to be costive, and also in disorders of the skin.

Jalap Bolus.

Take of powdered jalap half a drachm, powder of ginger six grains, syrup of buckthorn a sufficient quantity: this is a very safe and brisk cathartic, and is directed to be taken twice in a week, in all cases where purging is required.

Tin Bolus.

Take of prepared tin a drachm, conserve of rue half a drachm, simple syrup a sufficient quantity: this is a specific against worms, and is directed to be taken twice in a day.

Nephritic Bolus.

Take of lenitive electuary twelve ounces, Strasburgh turpentine four ounces, cream of tartar one ounce, mix them together. A drachm is directed to be taken twice in a day, in all obstructions and foulness of urinary passages.

Paralytic Bolus.

Take of mustard-seed two ounces, carraway-seeds, and winter's-bark, of each two drachms; ginger one drachm, spirit of turpentine one drachm and an half, simple syrup a sufficient quantity. An excellent medicine for the use its title expresses, and is to be taken a drachm twice in a day.

Itch Bolus.

See the bolus for the piles, page 25.

Pepper Bolus.

Take of conserve of rue three ounces, long pepper powdered, one ounce and an half, sal gem six drachms, simple syrup a sufficient quantity; the dose is a drachm twice in a day. It is prescribed in disorders of the stomach, and bad digestion, proceeding from a cold cause.

Rhubarb Bolus.

Take of powder of rhubarb half a drachm, simple syrup a sufficient quantity; to be taken twice in a week, as often as occasion may require.

Rhubarb Bolus, with Jalap.

Take of the rhubarb bolus a drachm, powder of jalap ten grains, mix them together: to be taken as the former.

Saponaceous Bolus.

Take hard soap one ounce, oil of aniseeds and carraway-seeds, of each half a drachm, simple syrup a sufficient quantity: the dose a drachm three times a day.

Saponaceous Bolus, with Hiera-picra.

Take of the saponaceous bolus one drachm, hiera-picra four grains, mix them together: to be taken twice in a day.

Saponaceous Bolus, with Rhubarb.

Take of the saponaceous bolus one drachm, powder of rhubarb ten grains, mix them together: to be taken twice in a day.

These saponaceous bolusses are prescribed with success, not only in the stone and gravel, but also in the jaundice and asthma; in the most obstinate cases of which, they are of the greatest service.

Squill Bolus.

Take of elecampane, and squills powdered, each one ounce; oil of aniseeds half a drachm, syrup of marshmallows a sufficient quantity: the dose is one drachm twice in a day.

In asthmatic and dropsical habits, this is an admirable medicine; but its use must be complied with for some time, and if so continued, the most obstinate obstructions of the small vessels, that cause both dropsies and

and asthmas, will give way to its efficacy.

Laxative Bolus.

Take of lenitive electuary one ounce, powder of jalap two drachms, mix them together; the dose is one drachm and an half, twice in a week: this is a safe and effectual fami y purge.

Laxative Bolus, with Mercury.

Take of the laxative bolus one drachm, calomel ten grains, mix them together; it is to be taken twice in a week.

Bolus for a Scrophula, or King's-Evil.

Take of burnt sponge one drachm, conserve of roses half a drachm, simple syrup a sufficient quantity.

Bolus for the Scrophula, or King's-Evil, with Nitre,

Take of the bolus for the schrophula two drachms, nitre ten grains, mix them together: these boluses are directed frequently in scrophulous habits; to be taken every night and morning, with a draught of sea-water after each dose.

Tartar Bolus.

Take of conserve of wormwood half a drachm; cream of tartar, and tartar of vitriol, of each h lf a scruple; salt of steel five grains; simple syrup a sufficient quantity: this is directed to be taken twiee in a day.

Mercurial Emetic Bolus.

Take of turbith mineral five grains, emetic tartar three grains, make into a bolus, with a scruple of conserve of roses: this is sometimes given to cause a revulsion, in an obstinate hernia humoralis; but as it will frequently operate with great violence, it is unsafe in infirm and weakly constitutions.

Bolus for the Small-pox.

Take of prepared crabs-claws eighteen grains, purified nitre six grains, simple syrup a sufficient quantity: this is given every six hours, with a few spoonfuls of the common julep, during the eruption of the small-pox.

A drachm of the powder of calamus aromatic we directed to be taken three times in a day, in all such like complaints arising from indigestion, and a cold stomach.

From ten grains to two scruples of Russia castor, are prescribed three times a day in nervous cases.

The cummin-seed cataplasm, and ripening cataplasm, are prepared according to the Supplement.

Cataplasm against the Rheumatism.

Take of fresh elder-flowers sixteen pounds, the best vinegar four pints, French sea-salt one pound, mix them together: apply a sufficient quantity to the part affected every other day.

The white, the yellow, the mercurial cerates, are prepared as directed in the Supplement.

Common Cerate.

Take of yellow wax, and oil of olives, each one ounce, mix them together.

Vitriolic Collyrium.

Take ten grains of white vitriol, and dissolve in two ounces of water; if a double quantity of water is made use of, it is called the vitriolic collyrium diluted. In all hot humours the eyes may be washed with a little of either of these collyriums, at discretion.

A scruple of the cordial confection of the London Dispensatory, is ordered to be taken every six hours, to promote a diaphoresis.

Mithridate, conserve of red roses, conserve of elder, conserve of rue, conserve of hips, and conserve of wormwood, are prepared according to the Supplement.

White

White Drink.

Take of burnt hartshorn ſix ounces, gum-arabic one ounce, boil them in a ſufficient quantity of water to ſtrain off a gallon: this is uſed for common drink in fluxes of the belly, and in the ſmall-pox and meaſles, when apprehenſive of a looſeneſs.

White Drink, with Gum-Arabic,

Is made by diſſolving five ounces of gum-arabic in a gallon of white drink. Its doſe is a quarter of a pint three times in a day: this is uſed in the ſame caſes as the former.

White Drink, with Nitre.

Diſſolve one ounce of nitre in a gallon of the white drink: its doſe is the ſame as the former: this is given in thoſe diarrhœas which are accompanied with a fever.

Aſtringent Decoction.

Take of burnt hartshorn ſix ounces, gum-arabic and pomegranate-ſhells, each one ounce; tormentil root four ounces; boil them in a ſufficient quantity of water to ſtrain off a gallon. A quarter of a pint of this decoction is to be taken three times in a day, in diarrhœas.

Decoction of Logwood.

Boil eight ounces of logwood in a ſufficient quantity of water, to ſtrain off a gallon. Its doſe is the ſame as the former, and it is uſed for the ſame intentions.

Common Decoction for a Clyſter,

Is prepared according to the Supplement.

Decoction of the Peruvian-bark.

Take of the Peruvian-bark, groſsly powdered, half a pound; boil it in a ſufficient quantity of water to ſtrain off a gallon: doſe three ounces three times in a day.

Decoction of the Peruvian-bark, wi Winter's-bark.

Take of the Peruvian-bark groſsly powdered, two ounces; boil it in four pints of water to a quart; when almoſt boiled, add an ounce of winter's-bark: the doſe is the ſame as the former.

Decoction of the Peruvian-bark, with Tincture of Bark.

Take of the decoction of the bark two ounces and an half; volatile tincture of the bark a drachm, mix them together: this doſe is to be taken three times in a day. Theſe are preſcribed in intermitting fevers, to perſons of a delicate conſtitution, whoſe ſtomachs cannot bear the bark in ſubſtance.

Dietetic Decoction.

Take ſhavings of ſaſſafras and guaiacum, each one ounce; liquorice root two ounces, coriander ſeeds bruiſed, half an ounce; boil them in a ſufficient quantity of water to ſtrain off a gallon: this is uſed as a ſweetner of the blood, in all obſtinate cutaneous cruptions and pocky complaints. Its doſe is half a pint twice in a day.

Decoction of Sarſaparilla.

Take ſarſaparilla eight ounces; boil it in a ſufficient quantity of water to ſtrain off a gallon: the doſe is half a pint four times in a day. This is very efficacious in removing thoſe pains which frequently remain after ſalivation.

Decoction of Simarouba.

Take of the bark of ſimarouba two ounces; boil it in a gallon and a half of water to a gallon: its doſe is a quarter of a pint three times in a day. This is a very powerful remedy in all fluxes of the belly.

Vulnerary

Vulnerary Decoction.

Take of ground-ivy, colts-foot, and liquorice-root, each two ounces; elecampane one ounce, boil them in nine quarts of water to a gallon: this is directed to be taken for common drink; or a quarter of a pint three times in a day, in all distempers of the breast.

Decoction of Elm-bark.

See this article in the Dispensatory of St. Bartholomew's Hospital.

Bay-berry Electuary

Is prepared according to the Supplement.

Armenian Bole Electuary, with Opium.

Take of the compound powder of Armenian bole, with opium, one ounce, syrup of white poppy-heads three ounces; mix them together. It is a restringent, and is given in diarrhœas, rhubarb having been previously administered.

A drachm of the lenitive electuary, prepared according to the Supplement, is given in costive habits, as often as occasion requires.

Scammony Electuary, of the London Dispensatory,

Is given a drachm and a half twice in a week, as a brisk purge in rheumatic disorders.

Electuary of Scordium, with Opium,

Is prepared according to the Supplement.

Volatile Acid Elixir.

Take of the volatile aromatic spirit six drachms, syrup of violets a drachm, dropped in spirits of vitriol till the fermentation ceases, and the liquid begins to look red. Its dose is a drachm twice in a day; sometimes a scruple of camphor is added.

Elixir of Aloes,

Of the London Dispensatory, is given from twenty to sixty drops every morning: this is an excellent stomachic.

A drachm of the elixir paregoricum, is given every night in asthmatic cases, which require the use of opiates.

Twenty drops of the acid elixir of vitriol, of the London Dispensatory, are given to strengthen digestion, brace up the fibres, and stop those sweats which so much weaken the constitution in consumptive disorders.

The following plasters, drawing, cephalic, common, and cummin-seed, are made according to the Supplement.

Cummin-seed Plaster, with Opium.

Take twelve ounces of cummin-seed plaster, strained opium one ounce, mix them together.

Cummin-seed Plaster, with Soap.

Take three ounces of the cummin-seed plaster, and one ounce of Castile soap, mix them together: these are both excellent discutients.

Strengthening Plaster for the Back.

Take eight pounds of the strengthening plaster of the London Dispensatory, and half a pound of yellow wax, mix them together.

Strengthening Plaster for the Back, with Opium.

Take of the above strengthening plaster twelve ounces, strained opium one ounce, mix them together: these are directed to be applied to the loins, in all weaknesses of those parts, from what cause soever; they are serviceable in the whites, and for children who are ricketty; they should be spread to cover quite down the spine, from the nape of the neck to the bottom of the back.

Galbanum Plaster.

Take strained galbanum one ounce and a half, yellow wax and myrrh, each half an ounce, Venice turpentine two drachms, mix them together: this admirably warms, softens, and discusses indurations of every kind.

Ischiatic Plaster.

Take of Burgundy pitch four ounces, euphorbium a drachm, mix them together: a good penetrating application for the purpose its title expresses.

Plaster for the Feet.

Take blister-plaster, and cephalic-plaster, of each an equal quantity: in fevers attended with a delirium, this is frequently ordered; because, by its irritation of the feet, it is supposed to increase the blood's velocity that way, and of course diminish it in the head.

Soap and Blister Plaster

Are made as directed in the Supplement.

Oily Emulsion.

Take of the volatile julep and water, each six ounces, oil of almonds four ounces, mix them together: this is a good medicine for a cough, and is to be given three large spoonfuls three times in a day.

Anodyne Clyster.

Take of the white drink four ounces, and dissolve in it two grains of strained opium: this is used particularly in fluxes attended with violent griping pains in the bowels.

Astringent Clyster.

Take of the white drink four ounces, and dissolve in it three drachms of the scordium electuary, with opium. Either of these clysters may be injected in obstinate fluxes, as often as occasion may require.

Common Clyster.

Take of the common clyster decoction half a pint, honey two ounces, lenitive electuary half an ounce, mix them together.

Common Clyster, with Oil.

Take of the common clyster ten ounces and an half, oil of olives two ounces, mix them together for use.

Emollient Clyster.

Take half a pint of milk, coarse sugar, and oil of olives, of each two ounces, mix them for use.

Oily Clyster.

Take five ounces of warm oil of olives.

Any of these may be injected as often as occasion requires, to procure stools in costive habits.

Clyster for the Piles.

Take six ounces of the astringent fomentation, and inject it warm.—Excellent for the blind piles, but must not be used where the patient has been accustomed to an hemorrhoidal discharge.

Turpentine Clyster.

Take of the common decoction eight ounces, Venice turpentine, dissolved in the white of an egg, and honey, half an ounce each, mix them together: this gives great relief in nephritic disorders.

Expression of Hog-Lice.

Take live hog-lice three ounces, water a pint and a half, brandy half a pint, mix these together: two ounces of the strained liquor are to be taken twice in a day, and this medicine is found to be very beneficial in dropsies, the jaundice, the asthma, and gravel.

Green Expression.

Take of the juice of artichoke eight ounces, compound juniper-water

water two ounces, mix them together. Four ſpoonfuls of this mixture are ſometimes given in the jaundice, on account of its diuretic quality, twice in a day.

Extracts, carthatic, of the Peruvian bark, of liquorice, of logwood, and of opium;

Flowers of Benjamin, flowers of ſteel, and flowers of ſulphur, are made as directed in the Supplement.

Aſtringent Fomentation.

Take gauls bruiſed one ounce, boil them in a ſufficient quantity of water to ſtrain off a pint: its title expreſſes its uſe.

Common Fomentation

Is made as directed in the Supplement, and uſed to foment old ulcers, wounds, &c.

Fomentation of Poppy-heads.

Take four ounces of white poppy-heads, boil them in two quarts of water to one quart, ſometimes two ounces of vinegar is added to this fomentation. this wonderfully aſſuages, and is therefore directed in ulcers which are very painful, and in all inflammatory tumours.

A ſcruple of factitious cinnabar is uſed for a fumigation; to be repeated as occaſion requires.

Aluminous Gargle.

Take of the common gargle eighteen ounces, alum half an ounce, mix them together: this is uſed in ulcerations of the tongue and mouth.

Common Gargle.

Take tincture of roſes a pint, honey of roſes two ounces, mix them together.

Contrayerva Gargle.

Take one ounce of figs, and half an ounce of contrayerva root, boil them in a ſufficient quantity of water, to ſtrain off twelve ounces; ſometimes two ounces of vinegar, and ſometimes half an ounce of tincture of myrrh, are added to this gargle, which is excellent in the putrid ſore throat.

Jelly of Starch.

Boil one ounce of ſtarch in a pint of water, to a proper thickneſs, then add two ounces of tincture of cinnamon, and half an ounce of the ſimple ſyrup. Four ounces of this jelly are frequently ordered to be taken, three times in a day, in the bloody flux.

Hydragogue Draught.

Take of ſimple cinnamon-water ſix drachms, oxymel of ſquills one drachm and an half, compound ſpirits of lavender half a drachm, ſalt of tartar half a ſcruple, mix them together: this is given every night, in all caſes where diuretics are required.

Oily Draught.

Take of the common julep and oil of almonds, each one ounce, mix them together: ſometimes this is made with linſeed oil, or olive oil. It is to be taken every ſix hours.

Oily Draught, with Diacodium.

Take two ounces of the oily draught, and one drachm of ſyrup of white poppies, mix them together. Its doſe is the ſame as the former: theſe are uſeful in diſorders of the breaſt and coughs, &c.

Oily Draught, with Manna.

Take of the oily draught two ounces, manna three drachms, mix them together: this is often directed in the gravel and ſtone, to be taken every ſix hours, and is a noble medicine.

Paregoric Draught.

Take one ounce of water, two drachms of ſpirituous alexiterial water, and half an ounce of ſyrup of white poppy-heads. mix them together, to be taken whenever occaſion requires.

It may be uſed in all caſes where opiates are proper.

Common purging Draught.

Take three ounces of the infuſion of ſena, one ounce of ſyrup of buckthorn, and half an ounce of carraway-water, mix them together: this is to be taken twice in a week, and is a very ſafe purge.

Solutive Draught.

Take three ounces of water, Glauber's ſalt ſix drachms, and half an ounce of the tincture of ſena, mix them together: this is directed to be taken as the former, where a gentle purge only is required.

Hiera-picra

Is made according to the Supplement.

Bitter Infuſion.

Take of gentian root half an ounce, orange-peel two drachms, zedoary one drachm, pour on theſe ingredients a ſufficient quantity of boiling water to ſtrain off twelve ounces; then add ſix drachms of ſpirituous orange water. Four large ſpoonfuls of this infuſion are to be taken twice in a day.

Bitter Infuſion, with Salt of Wormwood.

Take of the bitter infuſion a pint, and diſſolve in it a drachm of ſalt of wormwood: this is to be taken in the ſame manner as the former, and promotes digeſtion greatly.

Purging bitter Infuſion.

Take ſena three drachms, gentian root, orange-peel, and carraway-ſeeds, of each half a drachm; infuſe theſe ingredients in four ounces of boiling water, and when ſtrained, add half an ounce of carraway-water: this is to be taken twice in a week.

Bitter Infuſion, with the diuretic Salt.

Take of the ſimple bitter infuſion a pint, and diſſolve in it half an ounce of the diuretic ſalt. Its doſe is four ounces twice in a day: theſe are all excellent ſtomachics, and are directed to mend digeſtion, ſtrengthen the ſtomach, procure an appetite, and in windy diſorders of that organ.

Caſcarilla Infuſion.

Infuſe half an ounce of caſcarilla bark in a ſufficient quantity of boiling water to ſtrain off a pint. Its doſe is ſix ſpoonfuls twice in a day. See page 15.

Dropſy Infuſion.

Take equal parts of the bitter and paralytic infuſions, mix them together. Take a quarter of a pint twice in a day.

Laxative Infuſion.

Take of the infuſion of ſena, three ounces; manna, one ounce; carraway-water, two drachms; mix them together. This is to be taken twice in a week. Sometimes three drachms of Glauber's ſalt are added to this infuſion.

Laxative Infuſion, with Tincture of Sena.

Take three ounces of the laxative infuſion, and one ounce of the tincture of ſena; mix them together. It is to be taken as the former.

Infuſion of Sena

Is made according to the London Diſpenſatory, except carraway-ſeeds are uſed inſtead of cardamom-ſeeds.

Buck-bean Infuſion.

Take of dried buck-bean one ounce, infuſe it in a ſufficient quantity of boiling water to ſtrain off a quart. It is directed to be taken a quarter of a pint

pint three times in a day, in rheumatic, ſcorbutic, and ſcrophulous caſes.

Paralytic Infuſion.

Take of horſe-radiſh and muſtard-ſeed, each one ounce; winter's bark three drachms: infuſe in a pint and half of boiling water; when ſtrained off, add two ounces of carraway-water. Its doſe is a quarter of a pint twice in a day.

A ſcruple of ipecacoanha is directed to be taken, with a proper regimen, as an emetic, in all caſes where emetics are required.

Aſtringent Julep.

Take of the Armenian bole electuary, with opium, half an ounce; ſimple alexiterial water, half a pint; ſpirituous alexiterial water, two ounces; mix them together, and take three large ſpoonfuls after every looſe ſtool, or as occaſion requires, rhubarb having been previouſly exhibited.

Camphor Julep of the London Diſpenſatory

Is directed to be taken two ounces every ſix hours, to encourage a diaphoreſis, in epidemic, depreſſed, and malignant fevers.

Cordial Julep acidulated.

Take of ſimple alexiterial water half a pint, treacle water two ounces, ſyrup of red poppies half an ounce; mix them together for uſe.

Common Julep.

Take of ſimple alexiterial water half a pint, ſpirituous alexiterial water two ounces, ſimple ſyrup half an ounce; mix them into a julep. A few ſpoonfuls of either of theſe juleps are ordered to be taken to waſh down the alexiterial boluſſes.

Chalk Julep of the London Diſpenſatory

Is ſometimes made with barley cinnamon-water, inſtead of ſpring-water; and ſometimes two ounces of nutmeg-water, or tincture of cinnamon, are added to a pint of the julep.

Scordium Julep.

Take of the common julep without ſyrup, ten ounces; electuary of ſcordium with opium, half an ounce; mix them together into a julep.—Three ſpoonfuls of either of theſe juleps may be given in diarrhœas, after every looſe ſtool.

In diarrhœas, rhubarb ſhould always precede the uſe of reſtringents.

Muſk Julep of the London Diſpenſatory

Is given, four ſpoonfuls every ſix hours, in nervous and other fevers, attended with a low depreſſed pulſe, or convulſions. Muſk is alſo uſeful in meniacal affections.

Mint Julep.

Take of ſimple mint-water eight ounces, ſpirituous mint-water one ounce, loaf ſugar a drachm; mix them into a julep. Four large ſpoonfuls taken frequently are of great ſervice in removing nauſeas and retchings to vomit.

Mithridate Julep.

Take of the common julep without ſyrup ten ounces, mithridate half an ounce; mix them into a julep.

Venice Treacle Julep.

Take of the common julep without ſyrup ten ounces, Venice treacle a quarter of an ounce; mix them into a julep. Three large ſpoonfuls of either of theſe juleps are to be taken every ſix hours. Either of theſe juleps are very good diaphoretics.

Volatile Julep.

Take of the ſimple alexiterial water ten ounces, ſpirituous alexiterial water two ounces, loaf ſugar three drachms, volatile ſalt of hartshorn a drachm and an half; mix them into a julep. Its doſe is four ſpoonfuls three times in a day, in rheumatic, paralytic, or nervous caſes.

Volatile

Volatile Julep diluted.

Take of the volatile julep and ſpring water each ſix ounces; mix them into a julep; ſometimes three drachms of nitre, or four ounces of ſweet oil, are added. Its doſe is three ſpoonfuls three times in a day.

Two ſpoonfuls of ammoniacum milk of the London Diſpenſatory are to be taken, three times in a day, in aſthmatic complaints.

Ammoniacum Milk, with Oil.

Take ſix ounces of ammoniacum milk, and three ounces of ſweet oil; mix them together: to be taken three ſpoonfuls three times a day.

Ammoniacum Milk, with the Aſthmatic Mixture.

Take of ammoniacum milk and the aſthmatic mixture, each equal parts; mix them together: two ſpoonfuls to be taken three times a day.

Ammoniacum Milk, with the Volatile Julep.

Take of ammoniacum milk and the volatile julep, each equal parts; mix them together: three large ſpoonfuls to be taken three times in a day. Any of theſe mixtures may be taken in aſthmatic diſorders, according as particular circumſtances may indicate, and in all caſes where powerful expectorations are wanted.

Aſſafœtida Milk.

Diſſolve an ounce of aſſafœtida in a quart of water: this is an excellent medicine in hyſterical diſorders, and it is to be taken a large ſpoonful frequently.

Reſtringent Milk.

Take oak bark an ounce, pomegranate bark half an ounce, cinnamon two drachms; bruiſe them and boil them in milk and water, of each a quart, till half is boiled away: two ounces of this are directed to be taken three times in a day: it is an efficacious preſcription.

Pectoral Linctus.

Take of conſerve of hips four ounces; pectoral ſyrup and linſeed oil, each four pints; mix them together. A large ſpoonful of this linctus is to be taken when the cough is troubleſome.

White Liniment

Is made according to the Supplement.

Borax Liniment.

Take one ounce of oil of almonds, the yolk of one egg, and a drachm of borax; mix them into a liniment.

Saponaceous Liniment

Is made according to the London Diſpenſatory.

Saponaceous Liniment, with the Spirit of Sal Ammoniac.

Take ſixteen ounces of the ſaponaceous liniment, and one ounce of ſpirit of ſal ammoniac; mix them together. Theſe are both admirable diſcutients.

Viper Liniment.

Take colcothar of vitriol one drachm, vipers-fat one ounce; mix them together.

Volatile Liniment.

Take two drachms of bees-wax, and one ounce and an half of ſweet oil; melt them together, and then add an ounce and an half of ſpirit of ſal ammoniac. This is uſed in paralytic caſes, and to diſcuſs extravaſated blood, or humours, in ſtrains, &c.

Lixivium of Tartar

May be taken from twenty to ſixty drops twice in a day. This is a good aperient, and is given in diſorders which have their origin from obſtructions.

Lohoch.

Take of ſpermaceti, and conſerve of roſes, each an ounce, of the pectoral ſyrup two ounces, mix them together. Sometimes half an ounce of

of myrrh, or three drachms of nitre, or half an ounce of the testaceous powder, is added. It is a good pectoral, and is given, the quantity of a nutmeg, whenever the cough is troublesome.

Sulphur Lotion.

Boil six ounces of brimstone powdered, in a gallon of lime-water, till the pint is wasted away: this is a very cleanly application in the itch; but not so certain in its effect as the itch ointment.

Egyptian Honey, and Honey of Roses,

Are made as directed in the Supplement.

Honey of Roses, with burnt Alum.

Take honey of roses one ounce, and burnt-alum one drachm, mix them together: this is used to gargle the mouths of children in the thrush.

Mixture for Deafness.

Take oil of almonds three drachms, spirit of sal ammoniac one drachm, mix them together. A few drops are to be dropped in the ear, which is afterwards to be stopped with a little wool, every night going to bed, and generally affords great relief.

Saline Mixture.

Take salt of wormwood a quarter of an ounce, lemon juice three ounces, cinnamon water six ounces; mix them together: three large spoonfuls are to be taken every six hours, in sickness of the stomach or feverish complaints.

Asthmatic Mixture.

Take oxymel of squills half an ounce, simple pennyroyal water one ounce; mix them together. This is very good for what its title expresses, and this dose is to be repeated twice in a day. Sometimes half an ounce of sweet oil is added to this mixture.

Cordial Mixture.

Take of the common julep without syrup ten ounces, of the cordial confection a quarter of an ounce; mix them together. Three or four large spoonfuls are to be taken every six hours, where cordials are proper.

Emetic Draught.

Take a scruple of ipecacoanha, six drachms of oxymel of squills, and an ounce of water; mix them. A very safe and efficacious emetic.

Febrifuge Mixture.

Take two drachms of salt of wormwood, three ounces of lemon juice, and six ounces of the common julep; mix them together. Three spoonfuls are to be taken every six hours.

To the Febrifuge Mixture,

Sometimes two drachms of red coral, or two drachms of elixir of vitriol, or two drachms of alexiterial powder, or two drachms of lavender drops, are added, as particular circumstances require.

Oily Mixture.

Take oil of almonds and pectoral syrup, of each four ounces; mix them together. The dose is two spoonfuls three times in a day, in coughs, disorders of the breast, pleurisies, &c.

Olibanum Mixture.

Take gum olibanum half a drachm, of loaf sugar a drachm, spirituous orange water two drachms, spring water an ounce: to be taken every night and morning. *Vide* Guy's Hospital.

Mucilage of Quince-Seeds

Is made by boiling a drachm of quince-seeds in half a pint of water: this is an excellent gargle in soreness of the mouth, and to blunt sharp humours.

Nephritic

Nephritic Mucilage.

Take gum arabic, and gum tragacanth, of each one ounce, diſſolve in ſix pints of water, and add four ounces of ſyrup of marſhmallows: the doſe is three ſpoonfuls three times in a day.

Half a drachm of myrrh may be taken, twice in a day, in hyſteric diſorders.

Nitre may be given, to the quantity of a ſcruple, three times in a day, in inflammatory diſorders, gravel, ſore-throat, and heat of urine, as alſo to prevent mercury from affecting the mouth.

Oil of Sulphur.

Take of the flour of brimſtone one ounce, ſweet oil half a pint, boil them together over a ſlow fire: this medicine is commended in coughs, aſthmas, and conſumptions. Its doſe is from twenty to forty drops three or four times in a day.

Oxymel of Squills

Is made according to the Supplement, and is of great uſe in phthiſicky and aſthmatic diſorders.

London Philonium

Is a warm opiate, and may be given, to the quantity of a ſcruple, at night going to reſt.

Barbadoes tar, and rectified ſpirits of wine, of each equal quantities, mixed together, are uſed as an embrocation, with ſucceſs, in white ſwellings of the joints.

A ſcruple of the aſſafœtida pill of the London Diſpenſatory, may be taken, twice in a day, in nervous and hyſteric caſes.

Squill Pills.

Take ſixteen grains of aſſafœtida, and four grains of ſquills powdered, mix them into three pills, which are to be taken twice in a day, in the nervous aſthma, for which they are excellent.

Balſamic Pills.

Take of prepared hog-lice three drachms, gum ammoniacum a drachm and a half, flowers of Benjamin a drachm, balſam of Peru, and extract of ſaffron, each fifteen grains; balſam of ſulphur a ſufficient quantity to make into a maſs of a due conſiſtence; which is to be divided into pills of a middle ſize, four of which are to be taken twice in a day: theſe will do great ſervice where the lungs begin to be ſtuffed with viſcid or acrimonious juices, and will wear off thoſe ſhort huſky coughs, which are ſigns of tubercles, and beginning ulcerations.

Calomel Pills.

Take of the ſimple colocynth pill one ounce, calomel prepared half an ounce, mix them together. Half a drachm may be taken twice in a week, in all caſes where mercurial purges are judged proper.

Pills for a Catarrh.

Take twelve grains of Rufus's pill, add ſix grains of the ſtorax pill, and divide into three pills, which are to be taken every night going to reſt: this preſcription is intended to carry the phlegm downwards by ſtool, in aſthmatic caſes and catarrhs.

Cinnabar Pills.

Take a ſcruple of native cinnabar, and four grains of conſerve of roſes, mix them into a pill: this is to be taken every night and morning in obſtinate, nervous, and cephalic diſorders; and, to ſay the truth, cinnabar ſucceeds better in diſorders of the nerves, than any other medicine.

Strengthening Pills.

Take an ounce of rhubarb, and two ounces of boiled turpentine; mix them well together, and form into middle ſized pills, three of which are to be taken, twice in a day, in gleets, fluor albus, running of the reins, and diſorders of the kidneys.

Ephracti

Ephractic Pills.

Take of Rufus's pill and ſalt of ſteel; each eight ounces; ſtrained galbanum four ounces; make them into a maſs; a ſcruple of which is to be divided into three pills, and taken every night. This compoſition is a powerful deobſtruent, and is of uſe in all chronic diſorders from obſtructions.

Three middle-ſized pills of the gum pills of the London Diſpenſatory are ſometimes directed to be taken every night, in hyſterical and nervous complaints, with ſucceſs. They are rendered purgative by the addition of four grains of ſcammony to each ſcruple of the gum pill.

Mercurial Pills.

Take two ounces of quickſilver, extinguiſh the mercury with two drachms of balſam of ſulphur, then add a drachm of extract of liquorice, and an ounce of gum guaiacum; divide this into 144 pills, three of which may be taken every night.

Purging Mercurial Pills.

Take half a drachm of the mercurial pill of the London Diſpenſatory every morning. Either of theſe may be taken in caſes which require the adminiſtration of mercury, as circumſtances may dictate.

Anodyne Pills.

Take one grain of ſtrained opium, extract of liquorice three grains; mix into a pill, which may be taken every night, or as occaſion requires, where opiates are wanted.

Two middle-ſized pills of Rufus's pill of the London Diſpenſatory, given every night, will purge gently, and prove peculiarly ſerviceable in cold conſtitutions, indigeſtions, and hypochondriacal diſorders.

Rufus's Pill with Steel.

Take Rufus's pill and powder of ſteel, of each half a ſcruple; mix them together, and divide into three pills, which may be taken every night, in a ſuppreſſion of the menſtrual diſcharge.

Six grains of the ſtorax pill of the London Diſpenſatory are frequently given every night, to procure reſt in violent coughs.

Pills for the Venereal Diſeaſe.

Take of calcined mercury one grain, crumb of new bread two grains, mucilage of gum tragacanth a ſufficient quantity to make into a pill, which is to be taken every night. By adding four grains of aloes, is made the purging pill for the venereal diſeaſe. This is reckoned one of the moſt efficacious mercurial medicines.

Tragacanth Pills.

Take gum tragacanth and gum arabic, of each eight ounces, diſſolve them in half a pint of water, and, with eight ounces of liquorice powder, make into a maſs for pills, of which take three pills three times in a day. Theſe are uſed with ſucceſs in tickling coughs.

White Potion.

Take an ounce of balſam copaiva, diſſolve it in the yolk of an egg; ſyrup of marſhmallows four ounces, ſpring water a pint, brandy half a pint. Four ſpoonfuls of this mixture are directed to be taken three times in a day, in all diſorders of the urinary paſſages. It is alſo a good balſamic, and is preſcribed for many diſorders of the breaſt.

Potion of Balſam of Peru.

Take of balſam of Peru a ſcruple, yolk of egg a ſufficient quantity, water an ounce, brandy two drachms, ſyrup of marſhmallows a drachm and an half; mix them together for a draught, which may be taken twice in a day, in all diſorders of the breaſt.

Alexiterial Powder.

Take of the teſtaceous powder a pound and an half, powder of contrayerva root five ounces; mix them together. Its doſe is half a drachm every ſix hours, to promote a diſcharge by the ſkin.

Powder againſt the bite of a mad dog, and compound powder of aron-root, are made as directed in the Supplement. The doſe of both, is a ſcruple twice in a day.

Compound Powder of Armenian Bole, with or without Opium,

Is given, from three to fifteen grains, in caſes which require aſtringents, as often as occaſion requires.

Diuretic Powder.

Take of calcined egg ſhells a ſcruple, ſalt of wormwood and nitre, each five grains, mix them together. This powder is a very forcible diuretic, and may be given, three times in a day, in a proper quantity of any diluting liquid.

A ſcruple of the compound powder of myrrh of the London Diſpenſatory, is given, three times in a day, in hyſterical diſorders, and obſtructions of the menſes; ſometimes ten grains of powder of ſteel are added to each doſe.

Ophthalmic Powder.

Take of glaſs finely levigated, as much as you pleaſe. This is recommended to be blown into the eye, to remove ſpecks on the cornea.

Digeſtive Powder.

Take of cinnamon, nutmegs, and prepared amber, of each ten grains; white pepper five grains, mix them together. It is given twice in a day to mend digeſtion, in cold weak ſtomachs.

Powder for bearing down of the Anus.

Take of the balauſtine flowers, and Armenian bole, each one ounce, mix them together, and ſprinkle a little upon the part affected. An uſeful preſcription for the purpoſe.

From five grains to a ſcruple, of the compound ſcammony water of the London Diſpenſatory, may be given twice in a week. A good purge for children.

Scammony Powder, with Mercury.

Take of the compound powder of ſcammony, three ounces; calomel one ounce, mix them well together. The doſe is from ten grains to half a drachm, twice in a week. This is chiefly uſed for children, in diſorders proceeding from worms.

Sweating Powder.

Take ſtrained opium, and powder of ipecacoanha, of each two grains; tartar of vitriol and nitre, each eight grains. This may be taken every other night, in rheumatic caſes, and to promote a diaphoreſis. This is the ſame with Dr. Dover's powder, and is the noſtrum uſed by Dr. Ward for the cure of rheumatic diſorders. See Page 15.

The ſneezing powder is made as directed in the Supplement.

Teſtaceous Powder.

Take of crabs-claws prepared, half a pound; oyſter ſhells, and red coral, prepared, an ounce and a half each, mix them together. This is uſed in the heart-burn, and in all diſorders of children ariſing from acidities.

Compound Tragacanth Powder, of the London Diſpenſatory,

May be taken, from a drachm to two drachms, three times in a day. This is intended for an emollient to ſoften and heal any internal injuries, for which purpoſe it is preſcribed in ſpitting of blood, bruiſes, and diſorders of the kidneys; it cools the urine, and is of great ſervice in ſtranguaries.

A drachm

A drachm of the diuretic ſalt of the London Diſpenſatory is to be taken twice in a day, in anaſarcous and dropſical caſes.

Alum whey of the London Diſpenſatory is given a quarter of a pint twice in a day. This is highly recommended in the diabetes, and piſſing of blood. The method of preparing compound tragacanth powder, diuretic ſalt, and alum whey, is ſhewn in the Supplement.

Muſtard Whey.

Boil an ounce of muſtard ſeed in a quart of milk; of the ſtrained whey half a pint may be taken every night going to reſt, in rheumatic, gouty, or paralytic caſes.

Sinapiſm.

Take of wheat flour, and flour of muſtard-ſeed, each an equal quantity, and make into a proper conſiſtence for a pultice, with a ſufficient quantity of vinegar. This is uſed in paralytic diſorders, and is ſometimes applied to the feet in fevers attended with a delirium, to cauſe a revulſion.

Mercurial Solution.

Take of the corroſive ſublimate eight grains, brandy a pint, mix them together. The doſe is half an ounce, twice in a day, in venereal caſes, drinking plentifully of barley-water, or ſome other diluting liquor, after each doſe. This medicine has been attended with great ſucceſs in the military hoſpitals.

Aromatic Species.

Is prepared according to the Supplement, and is a good warm ſtomachic.

Scordium Species of the London Diſpenſatory, with or without Opium,

Is given, from three to fifteen grains, as often as occaſion requires, in diſorders which require reſtringent medicines.

Scordium ſpecies, ſpirits of ſal ammoniac, of hartshorn, of lavender compound, volatile aromatic, of aſſafœtida, and of turpentine, are made as directed in the Supplement.

Scorbutic Juices.

Take of ſcurvy-graſs a pound, brook-lime and water-creſſes, each half a pound, Seville orange juice ten ounces, mix them together, and take four ounces, twice in a day, in the ſpring time, againſt ſcorbutic complaints, and to cleanſe the blood from impurities.

Precipated Sulphur of the London Diſpenſatory

May be taken, twice in a day, in diſeaſes of the breaſt, and cutaneous diſtempers, to the quantity of half a drachm each doſe.

Four grains of the precipitated ſulphur of antimony, taken every night, is a very efficacious alterative.

Suppoſitories

Are made of honey boiled to a proper conſiſtence. They are uſed only where clyſters cannot be injected.

Syrups of marſhmallows, of ſaffron, of white poppy-heads, of red poppies pectoral, of roſes ſolutive, ſimple, and of violets, are made according to the Supplement.

Syrup of Buckthorn.

Take of buckthorn juice a gallon, Jamaica pepper and ginger, each an ounce and an half, coarſe ſugar ſeven pounds, boil them together into a ſyrup. This is uſed only to mix with other cathartics, to quicken their operation.

Troches for the Heart-burn.

Take of prepared chalk two ounces, prepared crabs-claws an ounce, Armenian

menian bole half an ounce, nutmeg ten grains, loaf ſugar an ounce and an half, make them into troches, by dropping on them a ſufficient quantity of water. An excellent remedy for that complaint.

Soluble Tartar

Is made according to the Supplement. Its doſe is a drachm every morning, in obſtructions, jaundice, dropſies, &c.

Half a drachm of the aromatic tincture of the London Diſpenſatory, may be taken twice in a day in flatulent complaints.

Equal parts of the aromatic tincture and elixir of vitriol, mixed, make an excellent ſtomachic. The doſe is a drachm twice in a day.

Tinctures aromatic, of cantharides, of cinnamon, and of myrrh, are made as directed in the Supplement.

Simple Tincture of the Bark

Is made according to the Supplement. Three drachms are to be taken three times in a day, in intermitting fevers, an impoveriſhed ſtate of the blood, and ſome nervous diſorders.

Volatile Tincture of the Bark

Is made according to the Supplement. Its doſe is a drachm three times in a day.

Tincture of Aſſafœtida

Is made according to the Supplement. Its doſe is a drachm twice in a day, in nervous diſorders.

Tincture of Wood-Soot

Is made according to the Supplement. Two drachms are to be taken twice in a day, in hyſterical caſes.

Tincture of Guaiacum.

Take gum guaiacum an ounce, melaſſes ſpirit a pint, digeſt them together for ſome days. Two ſpoonfuls are to be taken every morning, in rheumatic diſorders.

Volatile Tincture of Guaiacum.

Take of gum guaiacum four ounces, digeſt for ſome days in a glaſs well ſtopped, in a pint and an half of the volatile aromatic ſpirit. Its doſe is a drachm every morning, and it is uſed for the ſame purpoſes as the other tincture.

Tinctures of Jalap and Japan Earth

Are made according to the Supplement. Two drachms are the proper doſe of each.

Tincture of Flowers of Steel.

Take flowers of ſteel four ounces, digeſt them a ſufficient time in a pint of melaſſes ſpirit. From five to thirty drops are given in hyſterical complaints and female obſtructions, twice in a day.

Tincture of Steel, with Spirit of Salt.

Take of filings of iron half a pound, Glauber's ſpirit of ſalt three pints, rectified ſpirit of wine three pints; macerate the filings of iron in the ſpirit of ſalt, without heat, till the ſpirit has corroded the iron; when the fæces have ſubſided, the liquor muſt be evaporated to a pint, and the ſpirit of wine be added. The doſe, twenty drops twice in a day, in hyſteric diſorders and obſtructions of the menſtrual diſcharge, and is a much ſafer medicine in ſanguine habits.

Tincture of Black Helebore.

Take of black helebore four ounces, cochineal two ſcruples; digeſt them a ſufficient time in a quart of melaſſes ſpirit. The doſe is a drachm twice in a day, in the ſame caſes as the former.

Tincture of Rhubarb.

Take three ounces of rhubarb, ſix drachms of carraway-ſeeds, melaſſes ſpirit a pint, ſpring water a quart, digeſt

digeſt them together. Two ounces are to be taken twice in a week, or as often as occaſion requires, in diſorders of the bowels and ſtomach.

Tincture of Rhubarb, with Jalap.

Take tincture of rhubarb an ounce and an half, powder of jalap eight grains, mix them together. To be taken as the former. This is vaſtly more purgative.

Tincture of Rhubarb, with Venice Treacle.

Take tincture of rhubarb an ounce and an half, Venice treacle a ſcruple, mix them together; to be taken every other night.

Tincture of Roſes.

Take half an ounce of red-roſe buds, oil of vitriol twenty drops, boiling water two pints and an half, loaf ſugar an ounce and an half, when cold ſtrain off the liquor, and take three ounces, three times in a day. This is a very grateful julep in all caſes that require coolers and ſubaſtringents, and nothing is better ſuited for waſhing down boluſſes or electuaries of the Peruvian bark.

Tincture of Aloes.

Take ſuccotrine aloes eight ounces, Winter's bark two ounces, melaſſes ſpirit four pints, ſpring-water ſix ounces, digeſt them together. The doſe two ounces as often as occaſion may require; ſometimes a drachm of compound lavender drops, or half an ounce of ſyrup of buckthorn, is added to each doſe. This is a warm cathartic, and is given in nervous and paralytic caſes, and diſorders of the female ſex.

Saturnine Tincture.

Take ſugar of lead and green vitriol, of each two ounces, digeſt them a ſufficient time in a quart of rectified ſpirit of wine. The doſe twenty drops twice in a day.

Tincture of Snake-Root.

Take three ounces of Virginian ſnake-root, digeſt with two pints of melaſſes ſpirit. This is a powerful alexipharmic. Two drachms are to be taken every ſix hours.

Styptic Tincture.

Take one drachm of calcined vitriol; infuſe it in a quart of brandy in a wooden caſk. The doſe two drachms as often as occaſion requires. This can be but little depended on, and is uſed only among other articles for the ſame intention.

Thebaic Tincture

Is prepared according to the Supplement. Its doſe is from twenty to thirty drops, every night going to reſt, in all caſes where opiates are proper.

Tincture of Valerian

Is prepared according to the Supplement. The doſe is three drachms three times in a day, in nervous caſes.

Volatile Tincture of Valerian.

Take four ounces of valerian, infuſe in a quart of the volatile ammoniac ſpirit. The doſe is half a drachm three times in a day, in the ſame caſes as the former, and where the ſpirits are much depreſſed.

Troches of Nitre.

Take two ounces of nitre, and half a pound of loaf ſugar, make into troches with the mucilage of gum tragacanth. Theſe are good in inflammations of the throat, and are more effectual than moſt gargles contrived for thoſe purpoſes.

Two drachms of the powder of valerian root are often preſcribed in nervous diſorders, to be taken three times in a day, with great ſucceſs.

Alkaline

Alkaline Aloetic Tincture of the London Dispensatory

Is directed to be taken, to the quantity of a drachm, every night, as an alterative in all cachexies, and is to be continued for a long time together.

Antimonial Wine.

Take saffron of antimony an ounce, white wine a pint and an half, digest them together. Twenty drops may be given twice in a day; and, if continued for some time, prove an efficacious alterative in chronic distempers; or two ounces may be given as an emetic.

Ointments of Marshmallows and Basilicon,

Are made according to the Supplement; and are used, the first as an emollient, the last as the common digestive, in almost all kinds of green wounds.

Emollient and discutient Ointment.

Take four ounces of the marshmallow ointment, and one ounce of spirits of turpentine; mix them together.

Emollient Ointment with Opium.

Take of the emollient ointment six ounces, strained opium half an ounce; mix them together, Either of these ointments may be applied to any part bruised or indurated by obstructed humours; because they attenuate and warm the stagnant matter, and help to breathe it out through the pores of the skin.

Pile Ointment.

Take of the white liniment an ounce and an half, strained opium a drachm; mix them into an ointment. This will immediately give ease.

Blue or Mercurial Ointment.

Take one pound of hogs-lard, quicksilver half a pound, balsam of sulphur two drachms; rub them well together until the quicksilver is entirely extinguished. This is used to raise a salivation, by rubbing two drachms of it, every night, over the hands, arms, legs, and thighs, of the patient, before a good fire. Sometimes three or four unctions will raise a spitting, though, in some constitutions, half a pound, nay a pound, of this medicine has been rubbed in, and yet no salivation has followed. Sometimes the body being over costive will prevent a salivation rising, in which case a gentle laxative will promote it.

Ophthalmic Ointment.

Take of goose fat an ounce, prepared tutty half an ounce; mix them together. This is to be used every night going to bed, or oftener if occasion requires.

Pitch Ointment, and Blistering Ointment,

Are prepared according to the Supplement.

Itch Ointment.

Take hogs-lard a pound, flour of brimstone four ounces, lixivium of tartar one ounce, essence of lemons half a drachm; mix them together into an ointment. This is the common, and a very efficacious, ointment for the itch. It hardly ever fails of answering its end, if continued long enough, and applied every night.

From the SURGEONS' BOOKS.

The sharpest White-Wine Vinegar is used as a Discutient.

Lime-Water.

TAKE two pounds and an half of quick-lime, and pour on it a gallon of boiling water; stir the mixture well, and, when cold, strain it off for use. This is an excellent medicine for internal as well as external uses. It is not only approved of for inflammations, burns, cutaneous eruptions, the erysipelas, old ulcers, &c. but it is also famous for its virtues in the phthisic, dropsy, diabetes, and scurvy in northern climates; but how it comes to be remarkably serviceable against the scurvy in England, Holland, &c. and as remarkably pernicious in the same distemper in Italy, the southern parts of France, &c. has perplexed some eminent members of the Academy of Sciences at Paris; but is well accounted for by Boerhaave, in his Chemistry, page 192.

In the first volume of the Medical Observations of London, is a remarkable case of scorbutic ulcers in the legs of an old clergyman, being removed by the use of lime-water, after almost every other application had been tried for several years without success.

Phagedenic Water.

Take a pint of lime-water, and a scruple of white corrosive sublimate; make a solution thereof. This is a good lotion for old eating ulcers or venereal sores. It may be occasionally diluted by the addition of more lime-water, or mixed with a little spirit of wine, as circumstances may indicate.

Vitriolic Water.

Dissolve two ounces of blue vitriol in a quart of spring water. This is dabbed on sores to destroy fungous flesh, and is generally preferred to harsher methods.

Bougie.

Take quicksilver and lead, each two drachms; make them into an amalgama; then add, of crude antimony in fine powder, and Venice turpentine, each three ounces, white wax sixteen ounces. *Vide* St. Bartholomew's Hospital, page 17.

Hemlock Pultice.

Take of the hemlock fomentation a pint, and boil it with a sufficient quantity of oatmeal to a proper consistence for a pultice; then add two or three ounces of oil of olives. *Vide* the hemlock fermentation, page 44.

Common Pultice.

Take of the common fomentation a pint, boil it with a sufficient quantity of oatmeal till it is of a proper consistence; then add six ounces of sallad oil, and two ounces of rectified spirit of wine.

Discutient Pultice.

Take a pint of stale beer grounds, a sufficient quantity of oatmeal, and boil them to the consistence of a pultice; then add six ounces of oil of olives. This is infinitely preferable to any other application, in bruises, strains, mortifications, and all cases that require discutients.

Emollient

Emollient Pultice.

Take the crumb of ſtale rolls, and, with a ſufficient quantity of milk, boil it to a proper conſiſtence; then add ſome ſallad oil, to prevent its growing hard.

In uſing this pultice, care muſt be taken not to leave it on the part long enough to grow ſour; it ſhould therefore be changed every night and morning, otherwiſe it will do more miſchief than good.

Repellent Pultice.

Boil a pint of the ſharpeſt white-wine vinegar, with a ſufficient quantity of oatmeal to give it the proper conſiſtence, then add ſix ounces of oil of olives.

This, though ſimple, is efficacious, and is the pultice uſually applied to diſlocated limbs, to reduce the ſwelling, and abate the inflammation.

The common cauſtic is prepared as directed in the Supplement. Its uſe requires no explanation.

Lunar Cauſtic.

Take of the cryſtals of ſilver one ounce, put them into a crucible which is capable of containing five or ſix times their quantity, by reaſon they are apt to boil and ſwell. You muſt give a very gentle heat till the ebullition is over, then increaſe the fire a little till the ſilver ſinks and flows like oil, and caſt it into a warm greaſed ingot mould. It muſt be kept in a glaſs well ſtopped from the air.

Yellow Cerate.

Take a pint and a half of oil of olives, and a pound of yellow wax, and melt them together over a gentle fire.

The epulotic and mercurial cerates, are prepared as directed in the Supplement.

Plaſters, adheſive, common, and mercurial, are prepared according to the London Diſpenſatory, as directed in the Supplement.

Strengthening Plaſter.

Take five pounds of the common plaſter, and a pound of coleothar of vitriol in fine powder, and mix them together with a ſmall proportion of olive oils. This, though a ſimple compoſition, anſwers the intention well.

Common Fomentation.

Take of wormwood, bay leaves, and roſemary, each half a pound, boil them in a ſufficient quantity of water to ſtrain off a gallon: ſometimes ſpirits of wine, or ſpirits of wine camphorated, are added to this fomentation.

Hemlock Fomentation.

Boil four ounces of dried hemlock in a gallon and an half of water, till it comes to a gallon. Hemlock has been greatly recommended by Dr. Storck, of Vienna, for its virtues in cancerous caſes. This fomentation, and the hemlock pultice, are uſed externally, during the time the patient takes the extract of this plant inwardly. The method of taking the extract of hemlock, is to begin with taking only two grains night and morning, which may be gradually increaſed to the quantity of thirty grains in the twenty-four hours.

A fumigation of a ſcruple of native cinnabar, repeated as occaſion may require, is of ſervice in ulcers of the throat, and other obſtinate ſores from a venereal cauſe.

The Egyptian ointment of the London Diſpenſatory, is uſed externally to keep down fungous fleſh, to remove excreſcences, &c. as is alſo red precipitate, for the like purpoſes.

Angelic Powder.

Take red precipitate and burnt alum, each equal parts, mix them into a fine powder. This is an excellent eſcharotic preparation:

Oils of neats feet,
——— olives,
——— turpentine.

Tincture

Tincture of Myrrh.

Take myrrh in powder two ounces, melasses spirit and rectified spirit of wine, each half a pint; digest them together. This, as an external application, is used generally to carious bones, to promote exfoliation.

Detergent Ointment.

Take hogs-lard a pound, red precipitate an ounce and an half; mix them for use.

Another.

Take a pound of the yellow cerate, and mix therewith an ounce and an half of red precipitate in fine powder. Either of these may be used to procure a good discharge from wounds which afford a thin sanious discharge, as they act without giving the least pain, and are used in all the hospitals for that purpose.

Digestive Ointment.

Take yellow wax, rosin, and turpentine, each five pounds; oil of olives six pounds; and melt them together. *Vide* Yellow Basilicon, in all the hospitals.

Green Digestive Ointment.

Take a pound of the digestive ointment, two ounces of verdegris in fine powder, and two ounces of oil of olives; mix them together. This is a warm digestive and good detergent, and is therefore used to cleanse old ulcers, and wear away fungous flesh.

Ointment of Gum Elemi.

Take three pounds of mutton suet, one pound and an half of gum elemi, one pound of Venice turpentine, and six ounces of oil of olives; melt them together over a gentle fire. This is the digestive usually made use of in wounds of the head and brain, being imagined to possess peculiar virtues in those cases.

The ointment of three ingredients is prepared according to the London Dispensatory, as directed in the Supplement.

GUY'S HOSPITAL.

Purging Water.

TAKE of Dog-and-Duck water three pints, powder of ginger a drachm; boil them together till one-half is wasted away, and then add one ounce of manna. This quantity may be taken two or three times in a week, and is extremely gentle in its operation.

Rose-water, sapphire-coloured water, and balsam of sulphur, are prepared as directed in the Supplement.

Aromatic Bolus.

Take of toasted nutmeg a scruple, of the scordium electuary two scruples, and mix into a bolus with a sufficient quantity of syrup of white poppy-heads.

This bolus is to be taken every night and morning, and is directed in old diarrhœas and flatulent disorders.

Balsamic Bolus.

Take balm of Gilead one scruple,

liquorice powder and conſerve of hips, each half a ſcruple, and mix into a bolus with a ſufficient quantity of the ſimple ſyrup. This is recommended to be taken night and morning, with a draught of the pectoral decoction (page 48) in inward ulcerations and diſorders of the breaſt.

Camphor Bolus.

Take conſerve of hips a ſcruple, camphor ten grains; mix them together. To be repeated every eight hours.

This has been frequently found to promote a diaphoreſis, in fevers of the low depreſſed kind, when every other medicine has been tried without ſucceſs.

Cordial Bolus, with Venice Treacle.

Take of the compound powder of crabs-claws, Virginia ſnake-root and contrayerva-root, each ten grains, ſaffron five grains, and mix into a bolus with a ſufficient quantity of ſyrup of clove gilly-flowers.

Cordial Bolus, with Venice Treacle.

Take of the cordial powder and Venice treacle, each one ſcruple; mix into a bolus.

Either of theſe boluſſes may be taken every ſix hours, with a few ſpoonfuls of the cordial julep after every doſe, to promote perſpiration.

Cephalic Bolus.

Take conſerve of roſemary a ſcruple, powder of caſtor fifteen grains, and a ſufficient quantity of the ſimple ſyrup. This is a good medicine for the purpoſes its title expreſſes, and is to be taken three times in a day, with a few ſpoonfuls of the hyſteric julep, page 54.

Saffron Bolus.

Take conſerve of roſes fifteen grains, ſaffron one ſcruple; mix them into a bolus with ſimple ſyrup, which may be taken every ſix hours to promote a diaphoreſis.

Cinnabarine Bolus.

Take conſerve of orange-peels fifteen grains, cinnabar of antimony half a drachm; mix them together.

This bolus is directed to be taken twice in a day in cephalic and nervous diſorders, and in obſtinate rheumatic complaints.

Bolus for the Piles.

Take of lenitive electuary two drachms, flowers of brimſtone two ſcruples; mix them together.

This, though ſimple, is a very efficacious remedy, and is to be taken night and morning.

Epileptic Bolus.

Take conſerve of roſemary half a drachm, flowers of ſteel fifteen grains; mix them into a bolus, which may be given twice in a day in epileptic diſorders, with a cupful of valerian infuſion.

Emetic Bolus.

Take conſerve of roſes two ſcruples, turbith mineral eight grains; mix them into a bolus.

This operates very roughly, and is therefore ſeldom preſcribed but in very robuſt conſtitutions.

Calomel Bolus.

Take half a drachm of conſerve of roſes, and fifteen grains of calomel; mix them into a bolus.

Mercurial Bolus.

Take conſerve of orange peels a ſcruple, alkaliſed mercury half a drachm; mix them together. This is an excellent alterative, and may be taken twice in a week.

Guaiacum Bolus.

Take conſerve of orange peels and gum guaiacum, of each fifteen grains; mix them into a bolus with ſimple ſyrup. This may be taken night and morning, in all diſeaſes from obſtructed perſpiration.

Guaiacum Bolus, with Mithridate.

Take ten grains of gum guaiacum, and two ſcruples of mithridate; mix them into a bolus with the ſimple ſyrup. This is to be taken at night going to reſt, and is uſed for the ſame purpoſes as the former.

Muſk Bolus.

Take a ſcruple of conſerve of roſemary and ten grains of muſk; mix them into a bolus.

This may be taken two or three times in a day, and has been frequently experienced of ſervice in many nervous and hyſterical complaints, as well as in depreſſed fevers, to promote a diaphoreſis.

Myrrh Bolus.

Take conſerve of orange peels, and myrrh in powder, of each a ſcruple; ſalt of wormwood five grains; and make them into a bolus with ſimple ſyrup.

This ſhould be taken three times in a day, is good in hyſterical affections, and is of manifeſt ſervice in ripening the ſmall-pox, eſpecially that ſort where the puſtules riſe with a pellucid humour.

Pectoral Bolus.

Take half a drachm of ſpermaceti, a ſcruple of tragacanth powder, and mix them into a bolus with the ſimple ſyrup, which may be taken three times in a day.

Aſtringent Pectoral Bolus.

Take of the ſcordium electuary and tragacanth powder, each half a drachm, and, with ſyrup of white poppy-heads, make into a bolus, which may be taken twice in a day.

Purging Bolus.

Take fifteen grains of gamboge, ten grains of cream of tartar, five grains of powdered ginger, and make it into a bolus with the ſimple ſyrup. In dropſical habits this is a very common and a very good cathartic; for it thoroughly purges off watery and viſcous humours, and greatly promotes the diſcharge by urine; but, to render the cure of a dropſy laſting, there is afterwards a neceſſity of reſtoring and ſtrengthening the tone of the parts by proper medicines for that purpoſe.

Tin Bolus.

Take conſerve of orange peels a ſcruple, of prepared tin half a drachm, and with the ſimple ſyrup make into a bolus, which may be taken twice in a day.

This is particularly deſtructive to worms, and is with ſome a ſecret againſt that ſpecies called the joint-worm.

Bolus for the King's Evil.

Take conſerve of orange peels and burnt ſponge, of each a drachm, and make into a bolus with the ſimple ſyrup. To be taken three times in a day.

This is given in all kinds of ſcrophulous diſorders, at the ſame time with the water.

Turpentine Bolus.

Take of clarified honey and the æthereal oil of turpentine, each half a drachm, liquorice powder as much as will give it the conſiſtence of a bolus. This is to be taken twice in a day, and will effectually diſlodge thoſe viſcidities which clog the joints, and occaſion iſchiatic pains, but its uſe requires caution.

Aluminous Collyrium.

Diſſolve a drachm of alum in ſix ounces of roſe-water. This is applied to repel a defluxion of ſharp humours on the eyes.

Confection of alkermes, cordial confection, conſerves of orange peels, hips, roſemary, roſes, the white de-

coction, and clyster decoctions, are prepared as directed in the Supplement.

Restringent Decoction.

Take of the Peruvian bark one ounce; balaustine flowers, pomegranate shells, and tormentil roots, each half a drachm; bruise them, and boil in a sufficient quantity of water to strain off a quart. Four spoonfuls may be taken two or three times in a day, in those disorders which require the assistance of restringents.

Dietetic Decoction.

Take of guaiacum shavings and bark, each a pound; liquorice root half a pound; coriander seeds two ounces; boil them in six gallons of spring water to four gallons, and while boiling add two ounces of mezereon roots.

Half a pint is given three times a day, as the ordinary sweetener in any course of alteratives, for cutaneous eruptions, leprosies, and venereal disorders. It is very much like the diet-drink with which Dr. Wall cured his venereal patients; the great success from it is supposed to arise from the mezereon root, which seems peculiarly adapted to dissolve nodous swellings.

Febrifuge Decoction.

Take of the Peruvian bark powdered two ounces, boil it in three pints of water to one pint; strain, and add a tea-cup full of brandy. Four large spoonfuls of the liquor may be taken three or four times in a day. A very good method of administering the Peruvian bark in delicate constitutions, where the stomach is apt to recoil at the bark in substance.

Pectoral Decoction.

Take of liquorice-root bruised two ounces, boil it in a quart of barley-water to a pint and an half. A quarter of a pint may be taken at any time as common drink, in all disorders of the breast and lungs.

Decoction of Elm Bark.

See Bartholomew's Hospital, page 2.

Restringent Electuary.

Take of the scordium electuary and dragons-blood each six drachms; alum, Japan earth, and cinnamon, each two drachms and an half; make into an electuary with the simple syrup.

The quantity of a nutmeg is directed to be taken two or three times in a day, in the most obstinate fluxes of the belly, after proper doses of rhubarb have been administered.

Lenitive Electuary.

The dose is a quarter of an ounce as often as occasion may require.

Alterative Electuary.

Take of lenitive electuary an ounce, gum guaiacum and æthiops-mineral, each half an ounce; mix into an electuary with the simple syrup. The dose is a drachm twice in a day, drinking after it the dietetic decoction, or some other suitably medicated liquor. It is a most efficacious prescription in all foulness of blood whatsoever.

Chalybeate Electuary.

Take of the stomachic electuary two ounces and an half, prepared steel half an ounce; make into an electuary. The dose is a drachm twice in a day, and is an excellent medicine in a cachectic habit of body, and suppressions in the female sex.

Bark Electuary, with Alum.

Take one ounce of the Peruvian bark in powder, a quarter of an ounce of alum, and make into an electuary with the simple syrup. The dose is the quantity of a nutmeg every three or four hours.

Scammony

Scammony Electuary

Is prepared as directed in the Supplement: the dose is a drachm night and morning, twice in a week, in rheumatic cases.

Barbadoes Tar Electuary.

Take of virgin honey four ounces, gum olibanum, elecampane, and Barbadoes tar, each two ounces, make into an electuary with the simple syrup. A quarter of an ounce may be taken twice in a day; and where the stomach will dispense with it, will do great service in obstinate tickling coughs, and will succeed where more elegant medicines have failed.

Scorbutic Electuary.

Take of preserved aron-root, and Winter's bark in powder, each one ounce, mix them into an electuary with the simple syrup: the dose is a drachm twice in a day.

Stomachic Electuary.

Take of sweet cane, zedoary, galangals, and orange peel in powder, each half an ounce; simple syrup as much as will make an electuary: the dose is a drachm and an half twice in a day. It is a very good medicine in cholics, and all complaints arising from indigestion, and a cold weak stomach.

Elixirs, of aloes, stomachic, and of vitriol, are prepared as in the Supplement. Forty drops of each may be taken twice in a day.

Mynsicht's Elixir of Vitriol.

Take cinnamon, ginger, and cloves, of each three drachms; calamus aromaticus one ounce; galangals one ounce and an half; sage and mint dried, each half an ounce; cubebs and nutmeg, each two ounces; aloes wood, and citron peel, each a drachm; powder them together, and add to them sugar-candy three ounces, spirits of wine a pint and an half, and a pint of oil of vitriol; digest together thirty days, and then pour off the liquor, and filtre it for use: the dose from ten to forty drops in any suitable vehicle, two or three times in a day, observing to take it when the stomach is most empty. It is taken to promote an appetite, strengthen digestion, and in relaxed habits; being much preferable to the elixir of vitriol of the shops.

Strengthening Plaster.

Take of diachylon plaster five pounds, Burgundy pitch and colcothar of vitriol, finely powdered, each half a pound; olive oil two ounces; melt them together over a slow fire, stirring the whole till the ingredients are entirely mixed. A good application for strained limbs.

Anodyne Plaster.

Take cummin-seed plaster and yellow wax, each one ounce; opium and camphor, each two drachms; mix them together: this is calculated to give ease in arthritic pains, and all such as arise from acrimonious humours, whether from venereal or scorbutic causes.

Ischiatic Plaster.

Take Burgundy pitch four ounces, euphorbium in powder a drachm and an half, and make into a plaster, with a sufficient quantity of Venice turpentine. *Vide* St. Thomas's Hospital.

Volatile Plaster.

Take of volatile sal-ammoniac a drachm, camphor two drachms, and mix into an emplaster, with Venice turpentine. A warm discutient.

Restringent Clyster.

Take of the restringent decoction without the Peruvian bark, four ounces; of the scordium electuary half an ounce; mix them together.

Restringent

Restringent Clyster.

Take of the restringent decoction without the Peruvian bark, four ounces; of the scordium electuary half an ounce, mix them together.

Restringent Clyster, with Opium.

Take of the restringent clyster six ounces and an half, and dissolve in it two grains of pure opium. Either of these may be used in obstinate fluxes of the belly.

Common Clyster.

Take of the clyster decoction ten ounces, sweet oil three ounces, syrup of buckthorn one ounce, mix them together.

Cholic Clyster.

Take of the clyster decoction ten ounces, sweet oil three ounces, Glauber's salt one ounce, and powder of hiera-picra a drachm; mix for use.

Oleaginous Clyster.

Take of clyster decoction and sweet oil, each six ounces, mix them together.

Turpentine Clyster.

Take of the clyster decoction ten ounces, and mix therewith half an ounce of turpentine, incorporated with the yolk of an egg, and half an ounce of lenitive electuary: this is the clyster generally used in fits of the stone and gravel.

Restringent Fomentation.

Take of oak bark two pounds, of balaustine flowers half a pound, boil them in three pints of water, till one half is wasted away; then dissolve in the remaining liquor six ounces of common alum: this is the usual fomentation after cutting for the stone, and it will greatly astringe the fibres, not only so as to reduce a relaxed part to its proper tone, but also lessen any aperture of the vessels, made by incision, in such a manner as to hasten their re-union. It ought to be used as hot as possible without scalding.

Common Fomentation.

Take of wormwood, bay, and rosemary leaves, each four handfuls, boil them in a sufficient quantity of water to strain off a gallon, to which add a quart of malt or melasses spirits.

Poppy Fomentation.

Take two ounces of white poppy-heads, and boil them in a sufficient quantity of water to strain off a quart, to which add an ounce and an half of the best vinegar: this is used in inflammations of the eyes, and in wounds attended with great pain.

Alexipharmic Gargle.

Take of the pectoral decoction and alexipharmic tincture, equal parts, and mix them together: this gargle does wonderful service in the putrid sore-throat.

Common Gargle.

Take barley-water one pint, honey of roses three ounces, and make the mixture agreeably tart with spirits of vitriol: this is the best gargle that can be used for a cooler and detergent. Where the mouth has white specks, as is common in young children, it may be made more sour, if necessary, and rubbed hard upon those places, with a rag tied on a spoon, or skewer.

Volatile Gargle.

Take of the paralytic infusion a pint, and mix with it an ounce of spirits of sal ammoniac: this is very pungent and spirituous, and well contrived to warm and stimulate the fibres which have lost their tone in paralytic cases.

Anodyne

Anodyne Draught.

Take of London philonium thirty grains, ſimple mint-water ten drachms, Jamaica pepper-water a quarter of an ounce, mix them together for one doſe: this is a warm opiate, and is preſcribed in diſorders of the bowels, to be repeated at diſcretion.

Diuretic Draught.

Take of the ſtomachic draught two ounces, and diſſolve in it two drachms of the diuretic ſalt. One of theſe draughts may be given night and morning in dropſical habits, during the uſe of other medicines calculated for that diſorder.

Emetic Draught.

Take powder of ipecacoanha, fifteen grains, oxymel of ſquills ſix drachms, and ſimple alexiterial water one ounce, mix them for one doſe. A ſafe and efficacious emetic, if warm water is drank plentifully during its operation.

Epileptic Draught.

Take a drachm and a half of valerian finely powdered, loaf ſugar a drachm, and one ounce and an half of ſimple alexiterial water, mix them together. One of theſe draughts may be taken three times in a day, in nervous, paralytic, or epileptic caſes.

Nephritic Draught.

Take half an ounce of Venice turpentine, and incorporate it with honey; to which add three drachms of Jamaica pepper-water, and an ounce and an half of ſimple mint-water. One of theſe draughts ſhould be taken every night and morning.

Oily Draught.

Take of cold-drawn linſeed-oil half an ounce, ſimple alexiterial water one ounce, ſimple ſyrup two drachms, ſpirit of ſal ammoniac ten drops, mix them into a draught; to be taken every night and morning.

Theſe are in great eſteem, and much uſed in common practice, not only in inward ulcerations and diſtempers of the breaſt, but alſo in obſtructions of the urinary paſſages and ſome cholicky diſorders.

Purging Oily Draught.

Take oil of ſweet almonds, and ſimple alexiterial water, each one ounce, Jamaica pepper-water three drachms, Epſom ſalt one ounce; mix into a draught to be repeated as occaſion requires.

Olibanum Draught.

Take powder of gum olibanum half a drachm, mix it with a little honey, then add ſyrup of balſam, and Jamaica pepper-water, each two drachms; ſimple alexiterial water one ounce, mix together for one doſe: to be taken twice in a day.

This is uſually preſcribed for the whites, and to remove weakneſſes of the urinary parts.

Purging Draught.

Take three ounces of the infuſion of ſena, half an ounce of Jamaica pepper-water, and one ounce of ſyrup of buckthorn, mix together, to be taken three times in a week, or as often as occaſion may require. A ſafe cathartic in all caſes where purging is required.

Refrigerant Draught.

Take nitre and loaf ſugar, each two ſcruples, ſimple alexiterial water one ounce and an half, nutmeg-water two drachms. One of theſe draughts are to be taken every ſix hours.

Saponaceous Draught.

Take Venice ſoap one drachm, ſimple alexiterial water two ounces, lavender drops one drachm, ſimple ſyrup three drachms, mix into a draught:

draught: to be taken twice in a day, in the jaundice, ſtone, or gravel.

Stomachic Draught.

Take ſalt of Tartar one ſcruple; lemon juice half an ounce, ſimple mint-water an ounce, Jamiaia pepper-water half an ounce, mix into a draught: to be taken three times in day in nauſeas, &c.

Nervous Draught.

Take Ruſſian caſtor in powder one drachm, oil of amber twelve drops, ſal volatile twenty drops, ſimple cinamon-water two ounces, ſyrup of cloves two drachms, mix them into a draught. If taken twice in a day, it is of amazing efficacy againſt the diſorders its title expreſſes.

Sulphurated Draught.

Take of the ſimple alexiterial water two ounces, ſulphurated water half an ounce, ſimple ſyrup two drachms, mix into a draught: to be taken three times in a day.

This is preſcribed with ſucceſs, in fits of the convulſive aſthma.

Volatile Draught.

Take volatile ſal ammoniac fifteen grains, ſimple alexiterial water two ounces, and two drachms of the ſimple ſyrups; mix into a draught: to be taken every ſix hours to promote a diaphoreſis in low nervous fevers, or in the rheumatic fever.

Camomile Infuſion.

Take an handful of camomile flowers, infuſe them in a ſufficient quantity of boiling water to ſtrain off a quart, to which add a quarter of a pint of malt or melaſſes ſpirits: the doſe is a quarter of a pint twice in a day, to create an appetite, and promote digeſtion.

Paralytic Infuſion.

Take horſe-radiſh and muſtard-ſeed bruiſed, each three ounces, infuſe them in a quart of boiling water; when cold, ſtrain off the liquor, and add a quarter of a pint of malt or melaſſes ſpirits: three ounces may be taken two or three times in a day.

Infuſion of Valerian.

Take one ounce of bruiſed valerian root, infuſe it in twelve ounces of boiling water: when cold, ſtrain off the liquor, and add ſix drachms of compound lavender drops.

Three ounces may be taken two or three times a day in nervous and paralytic diſorders.

Cordial Julep.

Take half a pint of the ſimple alexiterial water, two ounces of Jamaica pepper-water, and ſix drachms of ſyrup of clove-gilly-flowers, mix them into a julep.

Common Julep.

Take of ſimple alexiterial-water eight ounces, treacle-water two ounces, of the ſimple ſyrup half an ounce, and mix them into a julep.

Hyſteric Julep.

Take half a pint of ſimple penny-royal water, two ounces of ſpirituous penny-royal water, half an ounce of the ſimple ſyrup, and mix them into a julep.

Mint Julep.

Take half a pint of ſimple mint-water, two ounces of ſpirit of mint, and half an ounce of the ſimple ſyrup, mix them into a julep. *Vide* St. Thomas's Hoſpital.

Styptic Julep.

Take half a pint of ſpring water, two ounces of the ſtyptic tincture, and half an ounce of ſyrup of quinces; mix them into a julep.

Three or four ſpoonfuls of theſe juleps, are preſcribed to waſh down medicines in a more ſolid form, calculated

culated for the purposes their respective titles express.

Two large spoonfuls of ammoniacum milk, prepared as directed in the Supplement, are directed to be taken in the asthma, whenever the shortness of breath is troublesome, and in all cases where expectoration is wanted.

Restringent Milk.

Take oak bark, pomegranate shells, and tormentil roots, bruised, of each two ounces, boil them in a pint of milk and a pint of water, till one half is wasted away; towards the end add two ounces of cinnamon, and strain off the liquor when cold: two ounces may be taken frequently: this is prescribed in those diarrhœas which accompany the last stage of consumptive disorders.

White Mercurial Liniment.

Take a quarter of a pound of hogslard, and two drachms of white precipitate, mix them together: this is a very neat and efficacious ointment for the itch, and all outward foulnesses of the skin; but the body must be kept open during the use of it, least, if the patient gets cold, a salivation might unexpectedly ensue.

Volatile Liniment.

Take half a pint of neats-foot oil, two ounces of spirits of wine and camphor, and two ounces of spirits of sal ammoniac, mix them together: this is a very powerful discutient, and is directed to be rubbed in upon any induration, as, by its warmth and subtilty, it attenuates the stagnant matter, and renders it fit to be taken up again by the absorbing vessels, or helps to breathe it out by the pores of the skin.

Sulphur Lotion.

Take half a pound of flour of brimstone, of any fixed alkaline salt two ounces, boil them in six pints of water to four pints; when cold, strain the liquor off for use. For its use see St. Thomas's Hospital.

Alkalized Mercury.

Take four ounces of quicksilver, and six ounces of crabs-eyes finely levigated, rub them together in a marble mortar till the quicksilver entirely disappears, and the powder is changed to a grey colour. From five grains to two scruples may be given in any vehicle twice in a day: this is a safe medicine, and may be given to young children for the worms, and all crudities and acrimony of the humours.

Mixture against Deafness.

Take one ounce and an half of oil of bitter almonds, and half a drachm of spirit of sal ammoniac, mix them together.

A few drops are to be poured into each ear every night, stopping them afterwards with cotton or black wool.

Pectoral Mixture.

Take cold-drawn linseed-oil, and syrup of balsam, each two ounces, mix them together: two large spoonfuls to be taken three times in a day.

Pectoral Mixture with Diacodium.

Take linseed oil and syrup of white poppy-heads, each two ounces, mix them together; the dose is the same as the former. Both are excellent medicines in pleurisies, inflammations of the lungs, coughs, and all disorders of the breast.

Asthmatic Mixture.

Take simple mint-water four ounces, Jamaica pepper-water, and oxymel of squills, each two ounces, mix them together: two spoonfuls are to be taken frequently: this is a powerful expectorant.

Restringent Mixture.

Take simple alexiterial-water six ounces, Jamaica pepper-water two ounces, of the scordium electuary half an ounce, mix them together: take two large spoonfuls after every loose stool.

Alterative Pills.

Take one drachm of calomel, two drachms of the scordium electuary, and, with a sufficient quantity of liquorice powder, make the mass into sixty pills, one of which may be taken every night and morning: these are used in venereal, scorbutic, and leprous disorders.

Ammoniacum Pills.

Take a scruple of gum ammoniacum, and six grains of the storax pill, mix them together for one dose; to be taken every night going to rest: this is a very good pectoral medicine.

Pills for a Cough.

Take Rufus's pill fifteen grains, of the saponaceous pill eight grains, divide into three pills, which are to be taken at night going to rest: this is well contrived to stop the defluxion of rheum which continually provokes coughing, and to divert it by a proper discharge.

Strengthening Pills.

Take rhubarb in powder one ounce, and make it into fifty pills, with a sufficient quantity of Venice turpentine; the dose is half a drachm twice in a day: these are directed with success in the fluor albus, and old gleets, free from virulence.

Ephractic Pills.

Take hiera-picra, gum ammoniacum, and prepared steel, each half an ounce, make into pills with the simple syrup. Half a drachm, divided into four pills; may be taken twice in a day.

This composition is a powerful deobstruent, and is therefore of use in almost all chronic disorders from obstructions: they keep the body moderately open, and will do great service in hypochodriac affections.

Quicksilver Pills.

Take quicksilver killed with Venice turpentine two drachms, scammony, jalap, and gamboge, two drachms each, make into a mass with syrup of buckthorn: the dose is half a drachm every morning.

It is certainly a good medicine in venereal, scrophulous, and leprous cases.

Hysteric Pills.

Take galbanum and gum ammoniacum, half an ounce of each, make into a mass for pills, with the simple syrup; the dose is a scruple twice in a day: this pill is excellently contrived to answer the purposes of an hysteric, being as effectual as it is simple and easy of preparation.

Stomachic Pills.

Take Virginia snake-root and hiera-picra, each two drachms, extract of gentian half an ounce, make into pills, with the white syrup: the dose is half a drachm, night and morning: these continued, for some time together, warm a cold weak stomach that is filled with crudities and flatulencies, and by degrees give new strength to the fibres, and procure a good digestion.

White Potion.

Take balsam of capivi, dissolved with the yolk of an egg, half a drachm, two drachms of the simple syrup, and one ounce and an half of simple alexiterial-water, mix them together; to be taken twice in a day.—*Vide* St. Thomas's Hospital.

Alexiterial

Alexiterial Powder.

Take of the compound powder of crabs-claws one ſcruple, Virginia ſnake-root four grains, contrayerva ſix grains; mix for one doſe: to be repeated every ſix hours, with a few ſpoonfuls of the cordial julep, to promote a diaphoreſis in fevers of the low depreſſed kind.

Antimonial Powder.

Take crude antimony in fine powder two ſcruples, æthiops-mineral one ſcruple; mix for one doſe: to be taken twice in a day. This is an admirable remedy in all cutaneous foulneſſes; as ſcabs, itch, herpes, leproſy, and the like; eſpecially if the patient be firſt bled, and purged with calomel, drinking at the ſame time the dietetic decoction, and anointing the eruptions with the itch ointment.

The powder for the bite of a mad dog is prepared as directed in the Supplement, and uſed according to the directions given by Dr. Mead for its adminiſtration.

Worm Powder.

Take prepared coral and ſcammony, finely powdered, each ſix drachms; reſin of jalap one drachm; mix together. Fifteen grains are the proper doſe, two or three times a week.

This purges very briſkly, and is extremely effectual againſt worms, eſpecially in young perſons.

The ophthalmic powder is white vitriol very finely powdered.

Common Purging Powder.

Take half a drachm of powder of jalap, twice in a week, in any liquid.

Purging Mercurial Powder.

Take rhubarb one ſcruple, calomel ten grains; mix them together. To be taken twice in a week.

Tin Powder.

Take of prepared tin one ounce and an half, worm-ſeed half an ounce; mix them together: the proper doſe is from ten grains to half a drachm night and morning. See the Tin Bolus, page 47.

Compound lavender drops, ſpirits of nitre, of ſal ammoniac, of wine camphorated, of vitriol, of ſal volatile; ſyrups, of white poppy-heads, of buckthorn, and ſimple, are prepared as directed in the Supplement.

Syrup of Cloves.

Take one pound of cloves and one ounce of cochineal, bruiſe them, and infuſe them in a veſſel cloſe ſtopped, in two gallons and a quart of boiling water, for twenty-four hours; then add twenty-eight pounds of loaf ſugar, and boil to a proper conſiſtence. This is uſed as a ſubſtitute for the ſyrup of clove-gilly-flowers.

Alexipharmic Tincture.

Take of contrayerva and ſnake-root bruiſed, each two drachms; cochineal a ſcruple; infuſe them in a ſufficient quantity of boiling water to ſtrain off twelve ounces, to which add four ounces of Jamaica pepper-water. Four ſpoonfuls may be taken every ſix hours, or oftener, according to the exigence of the caſe, in the beginning of acute diſtempers. It will, with proper diluters, raiſe a diaphoreſis ſooner than almoſt any other medicine.

Tinctures, bitter, aromatic, of antimony, of cantharides, of cardamoms, of caſtor, of ſaffron, of aſſafœtida, of guaiacum volatile, of ſteel, with ſpirit of ſalt, of myrrh, of ſena, of roſes, of lead, of ſnake-root, ſtyptic and thebaic, are prepared as directed in the Supplement.

Tincture to provoke the Menſes.

Take black helebore groſsly powdered four ounces, rectified ſpirits of wine twelve ounces; digeſt them together for three weeks.

This is an admirable medicine for many purpoſes, but particularly it excels in removing uterine obſtructions; and in ſanguine conſtitutions, where

ſteel is hurtful, this never fails of forcing the menſtrual diſcharge.—From twenty to ſixty drops may be taken twice in a day in any ſuitable vehicle.

Tincture of Japan Earth.

Take of Japan earth one ounce, Peruvian bark and balauſtines each half an ouuce; bruiſe them, and infuſe in half a pint of rectified ſpirits of wine, and four ounces of ſpirituous cinnamon water.

This is of good ſervice in all fluxes of the belly, dyſenteries, and immoderate flux of the menſes, and even in a gonorrhœa, and old gleets, where the virulence has been already removed. Its doſe is from a tea-ſpoonful to two tea-ſpoonſuls, in a glaſs of red-port wine, two or three times in a day.

Tincture of Rhubarb.

Take rhubarb groſsly powdered four ounces and an half, coriander or cardamom ſeeds two drachms; infuſe in a quart of water and a pint of melaſſes ſpirits.

This is a mighty mild and innocent tincture of rhubarb, and may with the utmoſt ſafety be given to young children, without danger of inflaming their tender viſcera, or raiſing a fever, by the burning ſpirit with which tincture of rhubarb is commonly extracted.

Yellow Baſilicon.

Take yellow roſin, and linſeed-oil cold-drawn, each five pounds; yellow wax two pounds and an half; common turpentine ten ounces; diſſolve the other ingredients in the oil, ſtir them well together, and then ſtrain the whole for an ointment: this is the common digeſtive in all green wounds, &c.

Ointment for a perpetual Bliſter.

Take half a pound of yellow baſilicon, and mix with it one ounce of Spaniſh-flies in fine powder: this ointment ſeems principally intended for dreſſing bliſters, in order to keep them running during pleaſure, as may be commodiouſly effected by ſpreading a little thereof upon a piece of linen, and applying it occaſionally to the part.

Emollient Ointment.

Take four ounces of ointment of marſhmallows, and mix with it one ounce of oil of turpentine.

Mercurial Ointment.

Take ſix ounces of quickſilver, and extinguiſh it in an ounce of Venice turpentine, then mix with a quarter of a pound of hogs-lard.

Ditto camphorated,

Is made by adding half an ounce of camphor to two ounces of the mercurial ointment.

Ophthalmic Liniment.

Take four ounces and an half of hogs-lard, bees-wax and prepared tutty each half an ounce, camphor two drachms; mix them together, and make thereof a liniment.

For ſimplicity and excellence few ophthalmic ointments can compare with this.

Itch Ointment.

Take two pounds of hogs-lard and four ounces of common brimſtone, mix them together into an ointment.

Refrigerent Ointment.

Take ſweet oil and bees-wax, each four ounces; ſpermaceti one ounce and an half; and make them into an ointment according to the rules of art. This is uſed in the eryſipelas, and to prevent pits in the face from the ſmall-pox.

Pale-coloured Mercurial Ointment.

Take hogs-lard one pound, and two ounces of mercury ſublimate; mix them together into an ointment.

Ointment

Ointment for a ſcaled Head.

Take one pound of tar, four ounces of common brimſtone, and one ounce of yellow wax; mix together into an ointment.

During the uſe of this ointment, proper alteratives ſhould be taken internally, and the child's head ſhould be covered with an hog's bladder.

Green Ointment.

Take half a pound of yellow baſilicon, and a drachm of verdigris; mix them together into an ointment. See St. George's Hoſpital.

St. GEORGE's HOSPITAL.

Camphorated Water.

TAKE Roman vitriol, and Armenian bole, each four ounces, camphor one ounce, and powder them together; of this mixture ſprinkle one ounce at a time into two quarts of boiling water, in which ſtir it well about, then take the liquor off the fire, and let it ſettle.

This is an excellent medicine for many purpoſes externally; it cleanſes ulcers, by waſhing them frequently with it warm; it is good againſt all inflammations, and almoſt infallibly cures ſore eyes: if it is too ſharp, it may be diluted with a little ſpring water; and in the itch it is both ſafe and efficacious.

Shell Lime Water.

Take of calcined oyſter-ſhells one pound, and pour on them a gallon of boiling water; the water ſhould ſtand four hours or longer on the ſhells, and it ſhould be made in an earthen veſſel.

This, according to Dr. Whytt, poſſeſſes the whole lithontriptic power of Mrs. Stephens's medicines. From three pints to two quarts muſt be taken every day, and continued till the cure is effected.

The diſagreeable taſte of the lime water may be mitigated by adding a very ſmall quantity of new milk to each doſe, and if it occaſions coſtiveneſs, it will be neceſſary now and then to take an ounce of manna diſſolved in whey, or barley-water; the patient ought to drink no more of any liquor than is ſufficient to quench his thirſt, and he ſhould retain his urine as long as he can without uneaſineſs, that it may have the longer time to act on the ſtone.

Mercurial Bolus.

Take half a drachm of conſerve of roſes, and half a ſcruple of quickſilver; mix them well together; rub till the mercurial globules are extinguiſhed; to be taken every night going to reſt: this is uſed as an alterative in caſes which require the aſſiſtance of mercury.

Rhubarb Bolus.

Take fifteen grains of torrified rhubarb, and one ſcruple of the ſcordium

dium electuary; mix them together for one dose; to be repeated as occasion may require, in disorders of the bowels.

Discutient Cataplasm.

Take of stale beer grounds a quart; oatmeal, as much as is sufficient to give a proper consistence. This cataplasm cannot be too much recommended in violent bruises, and even in beginning mortifications.

Medicated Ale.

Take scurvy-grass, water-cresses, and brook-lime, each three handfuls; broom ashes, a pound; horse-radish, and mustard seed bruised, each three ounces; juniper berries, two ounces; filings of steel, two pounds; infuse them in old strong beer for four days, then decant the liquor off for use. This is a good antiscorbutic, and in dropsical and cachectic habits will be of great service if continued for some time.

Vitriolic Collyrium.

Dissolve fifteen grains of white vitriol in two ounces and an half of spring water. Of great efficacy in removing specks and films on the eyes.

Decoction of Gum Arabic.

Dissolve half an ounce of gum arabic in a quart of barley-water; this is given for common drink in the stranguary, arising from the application of blisters.

Scarlet Decoction.

Take nitre one ounce, loaf sugar two ounces, and cochineal sixteen grains; boil them in a quart of water till the nitre is entirely dissolved; then strain off the liquor for use.

Two ounces may be taken two or three times in a day, to promote urine, and cool the urinary passages in gonorrhœas, stranguaries, &c.

Decoction of Chalk.

Take two ounces of prepared chalk, and half an ounce of gum arabic, boil them in a sufficient quantity of water to strain off a gallon. A good restringent in diarrhœas, after a few doses of rhubarb, or an emetic of ipecacoanha, and may be drank at pleasure.

Compound Hartshorn Drink.

Take six drachms of burnt hartshorn, three drachms of prepared crabs-eyes, comfrey and tormentil-roots, each two drachms; boil them in three pints of water to a quart, to which add one ounce of simple pepper-mint water, and half an ounce of syrup of white poppy heads.

Either this or the former may be taken as common drink in diarrhœas, and all acute diseases attended with a looseness, observing the foregoing caution.

Bran Water.

Take four handfuls of bran, and boil in six quarts of water to four quarts, then strain off the liquor, and add a quarter of a pound of the best honey. This is used as common drink in coughs and disorders of the breast.

Strong Guaiacum Decoction.

Take guaiacum shavings eight pounds, and macerate them in sixteen gallons of water for six hours; then boil for six hours, and strain off for use ten gallons.

The weak decoction of ditto is made by adding a pint of warm water to every quart of the strong decoction. This decoction is of service in venereal and scorbutic complaints, drank plentifully.

Bark Decoction.

Take of the Peruvian bark grossly powdered one ounce, water three pints; boil them together over a slow fire for three hours, then increase the fire,

fire, and boil for three or four hours longer, so as to pour off clear about one pint, to which add two ounces of melasses spirits. The dose is a tea-cup full every two hours, in intermitting fevers.

Decoction of Elm Bark.

Take of the inner bark of the elm one ounce, and boil it in a quart of of water to a pint; then strain off the liquor for use.

This makes an admirable gargle in ulcerations of the mouth, and is supposed to cure cutaneous eruptions, and even the leprosy itself.

Wormwood Electuary.

Take conserve of wormwood a pound, Winter's bark in powder half a pound, and mix into an electuary with syrup of ginger: the dose is the quantity of a nutmeg two or three times in a day, in all complaints arising from indigestion.

Acid Electuary.

Take conserve of roses and stoned raisins, each three ounces, oil of vitriol half a drachm, and mix into an electuary with two ounces of the simple syrup.

Pectoral Electuary.

Take conserve of hips one ounce and an half, spermaceti three drachms, prepared crabs-eyes one drachm; mix into an electuary with the simple syrup.

Elecampane Electuary.

Take elecampane, and Spanish liquorice dissolved in water, and gum ammoniacum dissolved in vinegar, each an equal quantity, and mix into an electuary with syrup of garlic.

The quantity of a nutmeg of either of these electuaries may be taken to promote expectoration three or four times in a day.

Chalybeate Electuary.

Take conserve of wormwood and prepared steel each two ounces, powder of ginger half an ounce, and mix into an electuary with the simple syrup. The dose is the quantity of a nutmeg twice in a day. Using exercise greatly assists the efficacy of this medicine in obstructions and other disorders incident to women.

Guaiacum Electuary.

Take conserve of wormwood, cinnabar of antimony, and gum guaiacum, each an equal quantity, and mix into an electuary with the simple syrup. The dose is the quantity of a nutmeg twice in a day, and is surprizingly efficacious in removing rheumatic disorders.

Compound Lenitive Electuary.

Take half a pound of lenitive electuary, one ounce of powder of jalap, a quarter of an ounce of sal prunella, and mix into an electuary with the simple syrup.

This purges very gently, and is generally given in the morning, the quantity of a nutmeg, to work off any mercurials which may have been taken over night.

Bark Electuary.

Take one ounce of the Peruvian bark in powder, and mix it into an electuary with the simple syrup: the dose is the quantity of a large nutmeg three or four times a day. See St. Thomas's Hospital.

Valerian Electuary.

Take two ounces of powder of valerian, and one ounce of cinnabar of antimony, mix into an electuary with syrup of ginger: the dose is the quantity of a large nutmeg three or four times in a day. An efficacious medicine in nervous complaints.

Bates's

Bates's Pepper-Electuary.

Take long-pepper one ounce and an half, rue half an ounce, sal-gem five drachms, and make into an electuary with twelve ounces of treacle. A warm stomachic, and of great service in flatulencies proceeding from a cold weak stomach.

Mustard Electuary.

Take whole mustard seeds, and conserve of wormwood, each equal parts, and mix into an electuary with syrup of ginger.

This is very efficacious in stimulating the fibres, and discussing viscidities, and is therefore excellent in paralytic, dropsical, and rheumatic disorders: the dose is the quantity of a large nutmeg three or four times in a day.

Balsamic Electuary.

Take spermaceti, and conserve of hips, each four ounces, prepared oyster shells one ounce, balsam of Peru six drachms, and make into an electuary with syrup of white poppy heads. The dose is the quantity of a large nutmeg, three or four times a day.

Care must be taken during the use of balsamic medicines, that they do not pall and relax the stomach too much, which they are apt to do; for which reason they are often acidulated with spirits of vitriol, or such things which help to keep the fibres of the stomach in their due tension.

Elixir of Vitriol.

Take Winter's bark, orange peels, and sweet cane grossly powdered, each an ounce; cloves and Jamaica pepper, each half an ounce; melasses spirits five pints; digest them together for four days, then strain off the tincture, and pour on it, by degrees, a pint and four ounces of oil of vitriol.

Anodyne Embrocation.

Take spirits of sal ammoniac and liquid laudanum, each half an ounce; spirits of wine camphorated three ounces; mix them together for use. This is very penetrating, and in rheumatic and arthritic swellings will do great service by relaxing the irritated fibres, at the same time that it promotes the perspiration of the obstructed parts.

Strengthening Plaster.

Take of diachylon plaster one pound, melt it over a slow fire, and stir into it three ounces of Armenian bole in fine powder.

Galbanum Plaster.

Take strained galbanum half a pound, frankincense, camphor, and oil of amber, each half an ounce; mix them together: this is intended to promote suppuration, for which purpose it is very efficacious.

Plaster for the Scrophula.

Take of the mercurial plaster, and the hemlock plaster of the Edinburgh Dispensatory, each four ounces, camphor three drachms; mix them together.

Blister Plaster.

Take two ounces of Burgundy pitch, fourteen ounces of melilot plaster, and half a pound of Spanish flies in fine powder; mix them together.

Common Clyster.

Infuse an handful of camomile flowers in two ounces of boiling bran water; when cold, strain off the liquor for use.

Oily Clyster.

Add two ounces of sweet oil to the common clyster.

Purging Clyster

Is made by adding to the oily clyster an ounce and an half of syrup of

of buckthorn, and half an ounce of common ſalt.

Starch Clyſter.

Diſſolve a quarter of an ounce of extract of logwood, in ſix ounces of ſtarch jelly.

Anodyne Starch Clyſter

Is made by adding a drachm of London philonium to the ſtarch clyſter: theſe two laſt are excellent clyſters in the bloody flux.

Reſtringent Clyſter.

Take of the chalk decoction ſix ounces, and diſſolve in it half an ounce of the ſcordium electuary.

This is generally uſed in obſtinate diarrhœas, after the uſe of rhubarb, or an emetic of ipecacoanha.

Turpentine Clyſter.

Take ſix drachms of turpentine diſſolved in the yolk of an egg, and mix it with ten ounces of the oily clyſter. See Guy's Hoſpital.

Emollient Fomentation.

Take of the dried leaves of mallows, and marſhmallows, with the flowers, each an handful; boil them ſlightly in a quart of water, and ſtrain off the liquor for uſe.

Diſcutient Fomentation.

Take wormwood and camomile-flowers, each one ounce, roſemary and bay-leaves, each half an ounce; boil them ſlightly in ſix pounds of water, and ſtrain off the liquor for uſe.

Compound Fomentation

Is made by adding a quart of vinegar, and a pint of rectified ſpirit, to two quarts of the diſcutient fomentation.

Volatile Fomentation.

Sprinkle a flannel, wetted in the diſcutient fomentation, with ſpirits of ſal ammoniac, immediately before you apply it to the part affected.

Antiſeptic Gargle.

Take barley-water a pint, white-wine vinegar two ounces, tincture of myrrh half an ounce, and two drachms of the aromatic tincture; mix together: this is the gargle uſually preſcribed in the putrid ſore-throat, in which it is of infinite ſervice.

Detergent Gargle.

Take half a pint of bran-tea, and half an ounce of honey of roſes, mix them together: this is frequently directed for ulcers, and inflammations of the mouth, &c.

Sometimes two ſcruples of oil of vitriol are added to this gargle, to render it ſtill more detergent.

Volatile Gargle.

Take half a pint of bran-tea, four ounces of melaſſes, ſpirits, and one drachm of ſpirit of ſal ammoniac, mix them together.

Palſy Gargle.

Boil one ounce of pellitory of Spain in a ſufficient quantity of water to ſtrain off a pint, to which add half an ounce of ſpirit of ſal ammoniac: theſe are both excellent medicines in the palſy of the tongue.

Cordial Draught.

Take one ounce and an half of ſimple alexiterial water, half an ounce of compound juniper water, and two drachms of the ſimple ſyrup.

Anodyne Draught.

Take one ounce and an half of the cordial draught, and twenty drops of the thebaic tincture, mix them together: to be taken at night going to reſt.

Camphorated Draught.

Take ten grains of camphor, honey one ſcruple, ſimple penny-royal water two ounces, mix together: theſe draughts may be repeated every ſix hours, and when a diaphoreſis is to be encouraged, nothing will ſooner

raiſe one, provided the patient drinks plentifully of ſmall diluting liquors.

Mithridate Draught.

Take of the cordial draught two ounces, mithridate one ſcruple, mix them together for one doſe; to be repeated every ſix hours.

Valerian Draught.

Take two ounces of the cordial draught, and half a drachm of powder of valerian; mix them for one doſe, to be repeated every ſix hours.

Sudorific Draught.

Take mithridate one ſcruple, the beſt white-wine vinegar half an ounce, ſimple alexiterial water one ounce, nutmeg water two drachms, ſimple ſyrup one drachm; mix together for one doſe; which is to be repeated as often as may be judged neceſſary.

Oily Draught.

Take ſix drachms of oil of almonds, one ounce of ſimple pennyroyal water, nutmeg water, and ſyrup of marſhmallows, each two drachms, mix together: one of theſe draughts may be taken three or four times in a day.

Oily Draught, with Rhubarb.

Take one ounce and an half of tincture of rhubarb, half an ounce of oil of almonds, two drachms of ſyrup of white poppy-heads, and fifteen drops of the thebaic tincture; mix together. In dyſenteries this is a moſt excellent medicine, ſince at the ſame time it both aſtringes, compoſes, and helps forward the evacuation of ſuch humours as vellicate the bowels, abrade their mucus, and lay open the capillaries in ſuch a manner as to cauſe the blood to flow at every ſtool.

Common purging Draught.

Take three ounces of the infuſion of ſena, one ounce of ſyrup of buckthorn, and three drachms of compound juniper water; mix them together.

Saline draught.

Take half a drachm of ſalt of wormwood, thirty drops of ſpirit of vitriol, one ounce and an half of ſimple mint water, two drachms of treacle water, and one drachm of the ſimple ſyrup.

Diaphoretic Draught.

Take two ounces of the ſaline draught, and a ſcruple of the diaphoretic powder; mix them together.

Diaphoretic Draught with Mithridate.

Take two ounces of the ſaline draught and one ſcruple of mithridate; mix them together.

Saline Draught, with Oxymel of Squills.

Take two ounces of the ſaline draught, and two drachms of oxymel of ſquills; mix them together.

Ditto with Valerian.

Take two ounces of the ſaline draught, and a ſcruple of valerian; mix them together.

Ditto with Rhubarb.

Take two ounces of the ſaline draught, and ten grains of rhubarb; mix them together.

Saponaceous Draught.

Take Caſtile ſoap, one drachm; diſſolve it in two ounces and an half of warm water, and add to it compound juniper water, and ſyrup of marſhmallows, of each a quarter of an ounce; mix together.

Epileptic Draught.

Take two ounces of the ſaline draught, ſalt of amber, and Ruſſia caſtor, each ten grains; mix together.

Squill Draught.

Take vinegar of ſquills one drachm, compound juniper water three drachms,

drachms, ſyrup of marſhmallows one drachm, and ten drachms of ſpring-water; mix together. An efficacious diuretic in dropſical diſorders.

Volatile Draught.

Take ten grains of ſalt of hartshorn, two ounces of penny-royal water, and a drachm of the ſimple ſyrup; mix them together.

The oleaginous Draught.

Take ten grains of ſalt of hartshorn, ten drachms of penny-royal water, half an ounce of oil of almonds, and two drachms of ſyrup of marſhmallows; mix them together. Theſe draughts are to be taken every ſix hours, in thoſe diſorders for which they are reſpectively calculated.

Bitter Infuſion.

Take gentian root ſliced, and dried orange-peel, each one ounce and an half; infuſe them in five quarts of boiling water; when cold, ſtrain off the liquor, and add to it one pint of melaſſes ſpirit. An excellent ſtomachic bitter.

Garlic Infuſion.

Take elecampane, and garlic ſliced, each one ounce, liquorice root three drachms, anniſeeds and carraway-ſeeds half an ounce each, infuſe in ſix pints of boiling water, and when cold ſtrain off the liquor for uſe.

This powerfully deterges the lungs, whence it gives great relief in aſthmas and difficulties of breathing.

Horſe-Radiſh Infuſion.

Take horſe-radiſh, and muſtard ſeeds bruiſed, each two ounces, dried orange-peels one ounce, Winter's bark half an ounce; infuſe in a quart of water over a very ſlow fire; when cold ſtrain of the liquor, and add to it a quarter of a pint of melaſſes ſpirits: the doſe of theſe infuſions is from a quarter to half a pint, every night and morning. This is ſerviceable in paralytic and rheumatic caſes.

Arabic Injection.

Diſſolve three drachms of gum-arabic in a pint of barley-water, and add one ounce and an half of honey of roſes.

Camphorated Injection.

Take of the camphorated water, page 57, a pint, Egyptian honey three drachms, and mix them together.

Terebinthinate Injection.

Take one pint of barley-water, and half an ounce of turpentine, diſſolved in the yolk of an egg, mix them together.

Acid Julep.

Take a pint of ſpring water, four ounces of treacle water, and one ounce and an half of ſyrup of vinegar, mix them together.

Chalk Julep

Is made by adding five drops of oil of carraways, mixed with a lump of ſugar, to a quart of the chalk julep as prepared in the Supplement. Three or four table ſpoonfuls may be taken at diſcretion.

Penny-royal Julep.

Take a pint of ſimple penny-royal water, four ounces of ſtrong penny-royal water, and an ounce of loaf ſugar; mix them together. Theſe are uſed to waſh down other medicines of greater efficacy.

Common Linctus.

Take three ounces of ſweet oil, ſyrup of white poppy-heads and marſhmallows, each an ounce and an half; loaf-ſugar, as much as is ſufficient to give it a proper conſiſtence: a tea-ſpoonful is to be frequently taken in coughs, &c.

Bituminous Liniment.

Take Barbadoes tar, and oil of tartar, each equal parts: this liniment is of surprizing service in white swellings.

Camphorated Liniment.

Take half a pound of rosemary leaves, and infuse them three or four days in two gallons of rectified spirits of wine.

Take a quart of this tincture, a quarter of a pound of Castile soap, and two ounces of camphor; digest them together with a gentle heat.

Oily Liniment.

Take a pint of neats-foot oil, two ounces of oil of turpentine, and three ounces of Castile soap; mix them together; these are both excellent discutients.

Ammoniacum Mixture.

Take ten ounces of ammoniacum milk, and ten drachms of oxymel of squills; mix them both together: three or four table spoonfuls are to be taken whenever the cough or shortness of breath is troublesome.

Restringent Mixture.

Take six ounces of simple alexiterial water, one ounce of nutmeg water, and three drachms of the scordium electuary; mix them together: three large spoonfuls are to be taken after every loose stool; rhubarb or ipecacoanha having been previously administered.

Laxative Mixture,

Take three ounces of sena, cream of tartar, and carraway seeds, each three quarters of an ounce; infuse them in a quart of boiling water; strain off the liquor when cold, and add four ounces of manna, and six ounces of tincture of sena: a large cupful of this mixture is to be taken at discretion.

Spermaceti Mixture.

Take two drachms of spermaceti dissolved in the yolk of an egg, six ounces of alexiterial water, one ounce of nutmeg water, and a drachm and an half of loaf-sugar; mix together.

Compound Spermaceti Mixture

Is made by adding one ounce of syrup of white poppy-heads, and forty drops of balsam of Peru, to seven ounces of the spermaceti mixture: these are prescribed in coughs, ulcerations of the lungs, and other disorders of the breast.

Volatile Spermaceti Mixture.

Take two drachms of spermaceti dissolved in the yolk of an egg, eight ounces of simple alexiterial water, two scruples of salt of hartshorn, and half an ounce of loaf-sugar; mix them together.

Calomel Pills.

Take five grains of calomel, and mix into a pill with conserve of roses: this is generally prescribed to be taken over night, and worked off with the common purging draught the next morning.

Chalybeate Pills.

Take prepared steel one ounce, extract of gentian as much as is sufficient to make it into a mass, which is to be divided into forty-eight pills: two pills are to be taken night and morning, in obstructions of the menses.

Assafœtida Pills.

Take assafœtida, camphor, and myrrh, each a drachm; Castile soap two drachms; make into a mass with tincture of wood-soot: a good nervous and antihysteric medicine: two middle-sized pills may be taken three times in a day.

Mercurial Pills.

Take three ounces of quicksilver, one ounce of powder of jalap, two drachms

drachms of powdered ginger, and make them into a mass with syrup of marshmallows: the dose from ten grains to a scruple, night and morning.

Pectoral Pills.

Take gum ammoniacum one ounce and an half; elecampane powder, and balsam of sulphur, half an ounce each; make into a mass with syrup of marshmallows.

Three moderate-sized pills, taken two or three times in a day, will do great service in asthmas, wheezing coughs, and all infarctions of the lungs.

Sagapenum Pills.

Take sagapenum one ounce, powder of valerian two ounces, Castile soap two drachms, make into a mass with elixir of aloes: two middle-sized pills may be taken two or three times in a day. This pill is excellently contrived to answer the purpose of an antihysteric, in all distempers of the head, epilepsies, hypochondriacal, hysteric, and nervous cases; it is as effectual as it is simple and easy of preparation.

Saponaceous Pill.

Take Castile soap half an ounce, gum guaiacum four scruples, and make them into a mass with the simple syrup: two middle-sized pills may be taken night and morning: these much promote insensible perspiration, are good in such cutaneous disorders as proceed from an obstruction of the perspirable matter, and very much relieve rheumatic and arthritic pains.

Squill Pills.

Take four scruples of fresh squills, two scruples of powder of ginger; make them into a mass with syrup of garlic, and divide into twenty-four pills; two of which, taken three times a day, as they cause a large expectoration, cannot but be extremely serviceable in phthisical and asthmatic cases.

Turpentine Pills.

Take two ounces of liquorice powder, make into a mass with Venice turpentine, and divide the mass into pills of a moderate size; two or three of which, taken night and morning, are very useful in weaknesses of either sex.

Aluminous Powder.

Take crude alum and Japan earth, each one ounce, and reduce them together into a fine powder: this is a very powerful astringent, and is used with success in old fluxes of the belly, after the use of rhubarb, or an emetic of ipecacoanha.

Dr. Dover's Powder.

Take vitriolated tartar and nitre, each four ounces; powder them together, and put them into a red-hot crucible; keep the mixture stirring about till the red fumes cease to rise; then powder it, and add one ounce of sliced opium; then powder again, and add one ounce of liquorice, and as much ipecacoanha finely powdered; mix them well together. Its proper dose is from twenty to forty grains, in any liquid, going to bed between the blankets, and drinking plentifully now and then something warm, such as white-wine whey, balm tea, the saline mixture, &c. The sweating is not to be checked, but encouraged by lying still and keeping warm.

Camomile Powder.

Take camomile flowers three drachms, myrrh and alum each one drachm; beat all together into a powder.

This is sometimes used in intermitting fevers, instead of the Peruvian bark: the dose a scruple, or half a drachm, every six hours.

Cochineal Powder.

Take loaf sugar and nitre, each four ounces, cochineal one drachm; beat all together into powder.

Worm

Worm Powder.

Take ſea moſs and worm ſeed, each one ounce; powder them together: this is an effectual medicine in worm caſes, where purging is not required, or after it has been fruitleſsly tried. A ſcruple may be taken night and morning.

Diaphoretic Powder.

Take four ounces of the compound contrayerva powder, and one ounce of ſaffron; mix them together: this is given to promote a diſcharge by the ſkin: the doſe from fifteen grains to half a drachm every ſix hours.

Purging Powder.

Take ſix drachms of jalap, and two drachms of ginger powder; mix them together.

Purging Powder with Nitre.

Mix two drachms of nitre with an ounce of the purging powder: the doſe of either of theſe powders is, from half a drachm to two ſcruples, three times in a week, in all caſes where purging is required.

Nitrous Powder.

Take nitre one ounce, Rheniſh tartar and brimſtone each two drachms; beat them into a powder. A cooling diuretic.

Sal Prunelle Powder.

Take ſal prunelle ſix drachms, oyſter-ſhells prepared two drachms; mix them together.

Compound Sal Prunelle Powder.

Mix two drachms of the diaphoretic powder, with one ounce of the ſal prunelle powder.

Plummer's Alterative Powder.

Take calomel and golden ſulphur of antimony, each equal parts; rub them together in a marble morter till the powder is changed to a duſky brown colour: ſeven grains and an half may be taken twice in a day, in cutaneous and leprous diſorders, with the dietetic decoction.

Rhubarb Powder.

Take rhubarb in fine powder half an ounce, of the diaphoretic powder two drachms; mix them together.

Red Powder.

Take loaf ſugar, ſpermaceti, and nitre, each half a pound; cochineal two drachms; mix them into a powder. This is generally preſcribed in pleuritic diſorders, and thoſe of the urinary paſſages.

Sponge Powder.

Take burnt ſponge half an ounce, nitre two drachms; mix them together. See Guy's Hoſpital.

Tin Powder.

Take three ounces of prepared tin, and one ounce of ſea moſs; mix them together. An efficacious medicine in diſorders proceeding from worms.

Brimſtone Powder.

Take flour of brimſtone one ounce and an half, oyſter-ſhell powder two drachms, cochineal two ſcruples; mix them together.

Alkalized Mercury.

Take quickſilver four ounces, prepared chalk ſix ounces; rub them together in a marble morter till the quickſilver entirely diſappears, and the powder looks of a greyiſh colour: this is a good alterative for children, whoſe ſtomachs generally abound with acidities. Its doſe from five grains to a ſcruple twice a day.

Mindererus's Spirit.

Take diſtilled vinegar two ounces, drop into it by degrees ſpirits of ſal ammoniac, till the effervescence entirely ceaſes.

When intended to promote a diaphoreſis, half an ounce may be given twice in a day, mixed with an equal quantity

quantity of syrup of marshmallows, and it will seldom fail; but if you design to provoke plentiful sweating, as in rheumatic diseases, &c. half an ounce must be taken every two or three hours, till the sweat breaks out, repeating the dose as occasion requires, when warm diluting liquors are not sufficient to keep the sweating up.

Syrup of Vinegar.

Take five pounds of loaf sugar, and dissolve over a gentle fire in two pints of vinegar.

Cerated Glass of Antimony.

Take glass of antimony in powder one ounce, bees-wax one drachm; melt the wax in an iron ladle, then add the powder; set them on a slow fire without flame for the space of half an hour, continually stirring them with a spatula; then take the mixture from the fire, pour it upon a piece of clean white paper, powder it, and keep it for use. The dose is from six grains to a scruple, according to the strength of the patient.

This medicine has been used with great success for the dysentery, and the preparation of it kept as a secret for many years.

Antimonial Tincture.

Take six drachms of antimonial wine, and two drachms of liquid laudanum; mix them together. From twenty drops to a drachm may be taken as an alterative twice a day.

Golden Tincture.

Take two ounces of elixir of aloes, and six drachms of tincture of steel in spirit of salt; mix them together: the dose from twenty to forty drops, two or three times in a day.

This is a good stomachic, and is of service in the jaundice, green sickness, and obstructions of the menstrual discharge.

Tincture of Wood Soot.

Take assafœtida and volatile sal ammoniac, each one ounce; wood soot two ounces, digest together with a gentle heat, in a quart of rectified spirit. From twenty to forty drops may be taken, two or three times in a day, in a glass of water, in all nervous and hysteric cases.

Tincture of Rhubarb.

Take rhubarb grossly powdered, three ounces, coriander seeds, and Winter's bark, each two drachms, digest them with a gentle heat, in a quart of melasses spirits, and a pint of water. *Vide* St. Thomas's Hospital.

Tincture of Sena.

Take raisins stoned, and sena, each eight ounces, carraway-seeds bruised, one ounce and an half, digest them for three weeks in two quarts of melasses spirits, without heat, then strain off the tincture for use: this is usually known by the name of Daffy's elixir, and is a warm carminative purge.

Tincture of Hiera-Picra.

Take one ounce and an half of the species hiera-picra of the old London Dispensatory, and digest with a gentle heat, in one pint of melasses spirits, and half a pint of water.

This is prescribed from two to three ounces, either over night, or early in the morning, as a stomachic, or a preparative to alterative courses, to cleanse the first passages, and enable the stomach the better to digest what it receives.

Yellow Basilicon.

Take of oil olive sixteen ounces, bees-wax and yellow rosin, each fourteen ounces, melt them together over a gentle fire, and while hot, strain the mixture for use. *Vide* Guy's Hospital, page 56.

Tar Ointment.

Take Barbadoes tar one ounce, sulphur vivum three ounces, flour of brimstone, and yellow wax, each three drachms; oil of olives as much as is required

required to give the whole the consistence of a soft ointment.

This is in high esteem for curing scaled heads in children.

Sir Hans Sloane's Ophthalmic Liniment.

Take prepared tutty one ounce, prepared blood-stone two scruples, aloes in fine powder twelve grains; mix them well together in a marble morter, with as much prepared vipers-fat as is requisite to bring the whole to the consistence of a soft ointment.

This liniment is to be applied with an hair pencil, the eyes winking, or a little opened; it has cured many whose eyes were covered with opake films, and cicatrices, left by inflammations and abscesses of the cornea. It is to be observed that catharties, especially with the addition of mercury, are prejudicial to the diseases of the eyes, which are cured by this medicine.

Turner's Cerate.

Take oil of olives eight pints, hogs-lard and yellow wax, each seven pounds, prepared calamine five pounds and an half, melt the wax and hogs-lard with the oil, and when the mixture begins to congeal, sprinkle in the calamine, and stir the mixture well till it is quite cold: this ointment is particularly serviceable in burns and scalds.

Itch Ointment.

Take sulphur-vivum half a pound, hogs-lard one pound, oil of tartar one ounce, mix together for use.

Vitriolic Ointment.

Take half a pound of hogs-lard, two ounces of flour of brimstone, and one ounce of white vitriol in powder, mix them into an ointment.

Either of these are very safe, and very efficacious in removing the most obstinate itchy or scorbutic eruptions.

Yellow Mercurial Ointment.

Take an ounce of quicksilver, and dissolve it in as much spirit of nitre as will serve for that purpose, then add by degrees a pound of melted hogs-lard, or butter, and keep the mixture stirring till it is quite cold. For the purposes of a detergent, this seems to be a fine contrivance.

Perpetual Blister Ointment.

Take yellow basilicon half a pound, Spanish flies in fine powder, one ounce, mix them well together. See Guy's Hospital.

Green Ointment.

Take half a pound of yellow basilicon, prepared verdigris a drachm, and mix them together for use.

This is a good detergent, and is used to cleanse old foul ulcers, and wear away fungous flesh.

THE

THE LOCK HOSPITAL, NEAR HYDE-PARK CORNER.

The Brown Collyrium.

TAKE of depurated white vitriol half a drachm, boiling water ſix ounces, mix and make into a collyrium.

In all inflammations of the eyes, this cooling waſh may be uſed at diſcretion.

The White Collyrium.

Take of the white troches of Rhaſi, one drachm; ten grains of camphor, diſſolved in a little rectified ſpirits of wine; and ſpring water ſix ounces; mix and make into a collyrium: this may be made uſe of in any defluxions of the organs of ſight, as it ſafely cools and repels thoſe ſharp humours which affect the eyes, and will clear them of beginning films and ſpecks.

The Collyrium, with Salt of Tartar and Lime-Water.

Take of ſimple lime-water half a pint, ſalt of Tartar one drachm; this is likewiſe uſeful in moſt diſorders of the eyes, particularly in ſpecks and films thereof.

A Decoction againſt Vomiting and Fevers.

Take ſix drachms of ſalt of wormwood, boil in three pints of ſpring-water, ſtrain the liquor, and drop into it gradually of ſpirit of vitriol as much as will ſufficiently impregnate it; then add three ounces of ſtrong alexiterial water, and the like quantity of refined ſugar.

Fevers, from too lax a ſtate of the fibres of the ſtomach, are often attended with nauſeas, and frequent retchings to vomit. In this caſe, three ſpoonfuls given now and then, particularly after every return of that complaint, ſeldom fail to give relief.

Bark Decoction.

Take Peruvian bark bruiſed two drachms, nitre half an ounce, boil the liquor in three pints of water to

half the quantity: ſtrain it off for uſe.

This form is contrived for thoſe whoſe ſtomachs, perhaps, would be apt to nauſeate the bark in ſubſtance. Two or three ounces are to be taken every ſix hours, as occaſion offers, in agues, or intermitting fevers, and a general relaxation of the ſolids.

Arabic Decoction.

Take gum-arabic one ounce, boil it in two pints of barley-water: when ſtrained, add nutmeg-water three ounces, refined ſugar a ſufficient quantity. In acidities of the ſtomach, in a ſtranguary, ariſing either from bliſters or any other cauſe, this decoction is a ſoft, eaſy, yet effectual remedy. A draught of it is to be drank at diſcretion.

Aſtringent Decoction.

Take of the Arabic decoction two pints and an half, boil in it tormentil root bruiſed half an ounce, then add to the ſtrained liquor conſerve of red roſes three ounces.

In all kinds of fevers, the ſmallpox, the meaſles, and acute diſeaſes, where the inteſtines, from too violent an irritation of their fibres by acid or acrid humours, are too much ſollicited to an evacuation of the ſerous matter of the blood by this canal, or are in a ſtate of too great relaxation, this aſtringent decoction, taken by way of common drink, will be found endued with ſalutary qualities, equal perhaps to thoſe of more pompous compoſitions.

Aſtringent Electuary.

Take compound powder of bole (either with or without opium, as you find occaſion) for which ſee the London Pharmacopœia; compound ſpecies of tragacanth, of the London Pharmacopœia, of each two ounces; ſimple ſyrup, a ſufficient quantity to form an electuary.

This is recommended in violent looſeneſſes. Half a drachm, or two ſcruples of it, at a doſe, generally abates thoſe immoderate evacuations of the lower belly; and repeated between whiles, for a day or two, will give an effectual check to the diſorder.

Bleeding, a vomit, and gentle purging with rhubarb, ought to precede the uſe of it.

An Electuary for a virulent Gonorrhœa.

Take lenitive electuary three ounces, powder of jalap one ounce, nitre half an ounce, ſyrup of roſes a ſufficient quantity to make an electuary.

A violent inflammation and tenſion in the urinary parts and paſſages, being ever attendant on a virulent gonorrhœa, nothing can be better adapted to the urgency of theſe ſymptoms than this electuary; which, by its cooling, diuretic, and laxative properties, is every way qualified to afford relief. The doſe is a drachm, to be taken night and morning. Should this quantity give more than three ſtools, the doſe muſt be leſſened: if not ſo many, increaſed.

An Electuary for a Gonorrhœa, after the Inflammation.

Take a pound of lenitive electuary, balſam of copaiva half a pound, powder of rhubarb, gum guaiacum, and nitre, of each four ounces; make into an electuary.

At this ſtage of the diſtemper, the heat and inflammation of the parts being over, this medicine is of very great uſe.

To be taken, a drachm night and morning.

A Strengthening Electuary.

Take conſerve of roſes one pound, gum olibanum in powder half a pound, myrrh in powder two ounces, ſimple ſyrup a ſufficient quantity to make into an electuary. The doſe is two ſcruples three times a day.

This is preſcribed in diſorders of the female ſex ſucceſsfully.

An

An Alterative Electuary.

Take conserve of roses four ounces, cinnabar of antimony prepared three ounces, gum guaiacum in powder two ounces, ginger in powder two drachms, simple syrup a sufficient quantity to make into an electuary.

As cinnabar and gum guaiacum are powerful attenuants, and plentifully promote perspiration, this electuary is very rationally directed in rheumatic pains.

The dose is a drachm night and morning.

A Mercurial Electuary.

Take quicksilver one ounce; conserve of roses three ounces; make into an electuary.

In all foulness of blood, productive of cutaneous eruptions, such as the itch, tetters, &c. this is a very efficacious remedy.

It may be taken twice a day, to the quantity of an ordinary nutmeg at each dose.

A Stomach Electuary.

Take conserve of orange-peel and sea worm-wood each two ounces, gum guaiacum in powder, Winter's bark in powder, nutmegs, cinnamon, and carraway-seeds, powdered, of each two drachms; syrup of ginger, a sufficient quantity to make an electuary.

This is a very warm and strengthening electuary to the stomach, and is of very great service in flatulencies arising from indigestion.

The dose is the quantity of a nutmeg three times a day.

Blister Plaster.

Take Burgundy pitch eight ounces, Venice turpentine, and cantharides in powder, of each two ounces and an half; mix and make into a plaster.

Blisters are useful in nervous fevers, and other cases where the pulse is low and languid, and the spirits depressed.

Common Clyster.

Take decoction of bran twelve ounces, lenitive electuary one ounce, common salt three drachms, olive oil one ounce; make into a clyster.

The use of this clyster is well known to every one, therefore need not be enlarged upon.

A Clyster for a Dysentery.

Take chicken-broth six ounces, Venice turpentine dissolved three drachms; make into a clyster.

This clyster is to be given immediately after every stool in a dysentery; and as occasion may require, add thebaic extract two grains.

Common Gargle.

Take tincture of roses six ounces, honey of roses two ounces, spirit of vitriol thirty drops; mix and make into a gargle.

This gargle is of a cool and deterging kind. It is used to cleanse and scour the glands of the mouth from the phlegmatic matter that stuffs and swells them, and may be used at discretion.

Common Julep.

Take spring water twelve ounces, strong alexiterial water three ounces, simple syrup half an ounce, make into a julep.

The intention of this julep is a vehicle for boles, powders, &c.

A Restringent Milk.

Take of pomegranate bark, balaustine flowers, and tormentil roots, of each half an ounce; cinnamon two drachms, bruise and boil them in three pints of water to two pints; towards the end of boiling, add a quart of milk, and conserve of roses three ounces, then strain it.

Two ounces of this milk may be taken, three times a day, in every case where astringents are proper.

A Mercurial Lotion.

Take corrosive sublimate mercury two drachms, spring water one pint, boil together till the mercury is dissolved.

This is calculated for the itch; the parts lightly to be washed with it two or three times a day.

An Astringent Mixture.

Take of the astringent electuary half an ounce, spring water six ounces, strong cinnamon water two ounces; make into a mixture.

This is of excellent service in all fluxes whatsoever, and a great strengthner of the stomach and bowels.

Its dose is a spoonful or two after every stool.

Saline Mixture.

Take salt of wormwood one drachm, spirits of vitriol eighty drops, spring water six ounces, spirituous mint water two ounces, syrup of balsam an ounce and a half; mix and make into a mixture. Three spoonfuls of this mixture to be taken every three hours in inflammatory fevers, and nauseas of the stomach.

White Mixture.

Take spermaceti in powder three drachms, olive oil half an ounce, yolk of egg a sufficient quantity, spring water six ounces, strong cinnamon water two ounces; make into a mixture.

This mixture is peculiarly calculated for freeing the lungs from that oppression which is essentially consequent to an inflammation of them.

The dose two spoonfuls, to be taken when the cough is troublesome.

Red Pill.

Take red precipitate deflagrated one grain, conserve of roses a sufficient quantity; mix and make a pill, to be taken morning and evening.

This is an excellent alterative, in cutaneous and venereal diseases.

Specific Pills.

Take calcined mercury one scruple, red coral prepared two scruples, thebaic extract ten grains, conserve of roses a sufficient quantity. Mix and form the mass into twenty pills.

These pills likewise are capable of doing great service in venereal and chronic disorders, and are at present supposed to be the most effectual mercurial medicine.

The dose is from one pill to four in a day, increasing the number by degrees.

A Purging Draught.

Take infusion of sena two ounces and an half, solutive syrup of roses, tincture of sena, and Glauber's salt, of each two drachms; mix and make a draught.

In all cases where moderate purging is necessary, this potion will be very properly prescribed.

A Diaphoretic Powder.

Take compound powder of contrayerva and nitre, of each a scruple; mix and make a powder.

This is given to promote a discharge by the skin, every four or six hours.

Nitrous Powder.

Take purified nitre and fine sugar, of each half a drachm; mix and make a powder.

Pectoral Syrup.

Take green liquorice one pound, cochineal half an ounce, boil in a sufficient quantity of water to strain off two gallons, then add of fine sugar twenty-five pounds, and boil it to the consistence of a syrup.

This is very properly contrived for all disorders of the breast.

Troches of Red Lead.

Take crumbs of white bread four ounces, corrosive sublimate mercury one ounce, powder of red lead half an ounce, rose water a sufficient quantity to make into troches.

These

These are contrived for external use only, and are powerful escharties.

An emollient Ointment, with Mercury.

Take ointment of marshmallows two ounces; elder ointment, quicksilver, one ounce of each; mix and make an ointment.

A digestive Ointment.

Take yellow wax twelve ounces; yellow rosin, frankincense, of each one pound; hogs-lard two pounds; mix and make into an ointment.

Green digestive Ointment.

Take of Arcæus's liniment three ounces, balsam of copaiva one ounce, green ointment of elder half an ounce, mix and make into an ointment. A most excellent digestive.

Mercurial digestive Ointment.

Take the digestive ointment and crude mercury, of each two drachms, mix and make into an ointment. A very efficacious application in venereal ulcers, where the use of digestives is required.

Brown Ointment.

Take olive oil two ounces; white wax, fresh butter, mutton suet, and litharge of gold, of each three ounces; boil the litharge with the oil till it becomes brown, after that add the other ingredients.

THE

PORTUGUESE HOSPITAL.

Diuretic and refrigerent Apozem

TAKE of grass-roots two ounces; boil in three pints of barley-water till one third is wasted away; add, a few minutes before it is removed from the fire, an handful of sorrel leaves, one ounce and an half of tamarinds, and two drachms of nitre. The dose, a quarter of a pint whenever agreeable to the patient. Its virtues are sufficiently expressed by its title.

Aluminous Bolus.

Take of alum fifteen grains, nutmeg and extract of the Peruvian bark, of each half a scruple; simple syrup a sufficient quantity to make a bolus. This bolus may be taken every six hours, where the stomach will bear so large a dose of alum; in which case it will warm and invigorate a cold relaxed stomach; and in old agues, which have eluded the force of bark alone, will seldom fail to effect a cure, if taken an hour before the access of the fit.

Solutive Anodyne Bolus.

Take of alum and the London philonium, each one scruple; mix them together for one dose. This bolus may be taken going to rest, or at any other time when required. It is excellent in cholicky disorders.

Borax

Borax Bolus.

Take of borax, myrrh, and nutmeg, in powder, each half a ſcruple, and make into a bolus with ſyrup of orange peels. This medicine may be repeated occaſionally, and has long been held in eſteem as an effectual remedy to promote child-birth.

Camphor Bolus.

Take of gum-arabic half a drachm, camphor one ſcruple, and mix into a bolus with ſyrup of marſhmallows. For its virtues, and doſe, ſee the ſame article in the foregoing hoſpital diſpenſatories.

Chalk Bolus.

Take of prepared chalk a ſcruple, nutmeg half a ſcruple, and mix into a bolus with the ſimple ſyrup. The doſe may be repeated every ſix hours. An excellent abſorbent and a mild reſtringent in diarrhœas; but its moſt experienced virtue is, in removing that uneaſineſs at the ſtomach, commonly called the heartburn.

Emetic Bolus.

Take of yellow emetic mercury in fine powder ſix grains, and mix into a bolus with conſerve of roſes. A rough and violent emetic, ſeldom uſed but to procure a ſtrong revulſion from the genital parts, in an hernia humoralis, phymoſis, or paraphymoſis, when, from the vaſt fluxion of humours, it is feared a mortification will enſue.

Anodyne fœtid Bolus.

Take of aſſafœtida one ſcruple, the confection, called paulina, fifteen grains; mix into a bolus. It is of conſiderable efficacy in flatulent cholics and hyſteric complaints; and may be repeated according to the urgency of the ſymptoms.

Gamboge Bolus.

Take gamboge and cream of tartar of each a ſcruple, and mix together into a bolus with ſyrup of buckthorn. A powerful hydragogue, and therefore good in dropſical diſorders; but its roughneſs requires the utmoſt caution in its exhibition.

Ipecacoanha Bolus.

Take of toaſted ipecacoanha a ſcruple, Winter's bark in powder ten grains, and mix into a bolus with ſyrup of orange peels. An uſeful reſtringent in diarrhœas and dyſenteries. To be repeated as occaſion requires.

Myrrh Bolus, with Steel.

Take of compound powder of myrrh half a ſcruple; flowers of ſteel and extract of ſavine, of each a ſcruple; mix into a bolus with ſyrup of orange peel: to be taken night and morning. A powerful emmenagogue.

Muſk Bolus.

Take muſk and zedoary root in powder, of each fifteen grains, and mix into a bolus with ſyrup of ſugar. If neceſſary, add a grain of thebaic extract. This bolus, without the opium, may be taken every four hours; it never fails producing a mild diaphoreſis, without heating; and has extraordinary effects in convulſive diſorders, even when attended with the worſt ſymptoms.

Olibanum Bolus.

Take olibanum, and ſpermaceti, of each fifteen grains, mix into a bolus with ſyrup of maidenhair.

Pepper Bolus.

Take of long-pepper a ſcruple, London philonium half a ſcruple, mix into a bolus with ſyrup of ſugar.

Rhubarb Bolus.

Take of rhubarb powdered, half a drachm; London philonium ten grains, mix into a bolus with the ſimple ſyrup. An elegant and efficacious remedy in all cholicky complaints.

Tin Bolus.

Take of prepared tin a drachm, mix into a bolus with conserve of orange-peel.

Contrayerva Bolus.

Take of contrayerva-root in powder half a drachm, nitre fifteen grains, mix into a bolus with the simple syrup: this bolus is to be taken every four or six hours, and is an useful diaphoretic.

Astringent Decoction.

Take of the Brazilian bark in powder one ounce and an half, boil in three pints of water to a quart, then strain off the liquor for use. A quarter of a pint may be drank two or three times in a day.

Bark Decoction.

Take two ounces of powdered Jesuit's bark, and boil in three pints of water to a quart, then strain off the remainder for use.

Diuretic Decoction.

Take of pareira-brava root in powder, two ounces, water two quarts, boil to three pints; add towards the end of the coction two drachms of fennel-seeds bruised, and strain off the liquor for use; the dose three or four ounces every four or six hours: this is greatly extolled against suppressions of urine and nephritic pains, and has been found useful, with the addition of balsam copaiva, in healing ulcers of the kidnies and bladders. Its attenuating quality renders it also of service in humoural asthmas, and jaundices proceeding from a viscidity of the bile.

Sudorific Decoction.

Take of the bark of guaiacum-wood, and sassafras-shavings, each one ounce, water two quarts, boil to three pints; add, a few minutes before the liquor is removed from the fire, half an ounce of stoned raisins, and two drachms of liquorice-root; strain off the liquor for use.

Aromatic and Anodyne Electuary.

Take of the aromatic species of the London Dispensatory, and pareira-brava root in powder, of each six drachms; London philonium three drachms; mix into an electuary with syrup of orange-peel; the dose, the quantity of a nutmeg night and morning. For its virtues, see the above diuretic decoction.

Astringent Electuary.

Take of the Brazilian bark in powder an ounce and an half, conserve of red-roses an ounce, mix into an electuary with syrup of orange-peel: the dose, the quantity of a small nutmeg every six hours, observing the usual cautions.

Balsamic Electuary.

Take of St. Thomas's balsam, first rubbed with loaf-sugar, and afterwards dissolved in the yolk of an egg, half an ounce; elecampane in powder an ounce and a half; mix into an electuary with syrup of maidenhair: the dose the same as the former. A good detergent pectoral.

Chalybeate Electuary.

Take of rust of steel six drachms, preserved ginger an ounce, conserve of orange-peels three ounces, mix into an electuary with syrup of orange peels. The quantity of a nutmeg to be taken two or three times in a day. This is adapted for those who labour under obstructions of the menses; it also gives relief in hypochondriacal disorders.

Brisk exercise is of great advantage in the use of this medicine.

Cinnabarine Electuary.

Take of cinnabar of antimony prepared one ounce, gum guaiacum three drachms, conserve of orange-peels two ounces, mix into an electuary with

with ſyrup of orange-peels; the quantity of a nutmeg to be taken night and morning: this is uſually given in nervous and rheumatic diſorders.

Bark Electuary.

Take of the Peruvian bark in powder three ounces, the eleutherian bark half an ounce; mix into an electuary with ſyrup of orange-peels.

Guaiacum Electuary.

Take of gum guaiacum in powder, compound powder of aron-root of the London Diſpenſatory, and Winter's bark, each ſix drachms; conſerve of garden ſcurvy-graſs two ounces; mix into an electuary with ſyrup of orange-peels: the doſe, the quantity of a nutmeg twice in a day: this promotes greatly natural tranſpiration, and is therefore of ſervice in cutaneous eruptions, and rheumatic pains.

Black Helebore Electuary.

Take of black helebore root in powder, extract of ſavine, and compound powder of myrrh, each half an ounce, Winter's bark two drachms; mix into an electuary with ſyrup of orange-peels: the quantity of a nutmeg may be taken night and morning. In ſanguine conſtitutions it is preferable to ſteel, and powerfully breaks through uterine obſtructions.

Saponaceous Electuary.

Take of Caſtile ſoap two ounces, pareira brava root in powder one ounce, rhubarb and aloes each three drachms; mix into an electuary with ſyrup of orange-peels: the doſe the quantity of a nutmeg twice or thrice in a day. This is particularly calculated for the jaundice.

Brimſtone Electuary.

Take of flowers of brimſtone waſhed half an ounce, lenitive electuary two ounces; mix into an electuary with ſyrup of marſhmallows: the quantity of a nutmeg is to be taken diſcretionally. It does great ſervice in the piles, eſpecially where perſons are ſubject to be coſtive.

Anodyne Diſcutient Plaſter.

Take of the cummin ſeed plaſter two ounces, camphor (rubbed down with a few drops of ſweet oil) three drachms, extract of opium a drachm and a half; mix together for a plaſter. A warm diſcutient, and is applied to ſtrengthen the viſcera, expel flatulencies, and appeaſe rheumatic and iſchiatic pains.

Arabic Emulſion.

Take of gum-arabic one ounce, diſſolve it in a pint of barley water: this may be drank diſcretionally. In heat of urine and ſtranguaries, either from epiſpaſtics or acrimonious humours, it gives immediate relief.

Balſamic Emulſion.

Take of St. Thomas's balſam three drachms, rub it well with loaf-ſugar, and mix with the yolk of an egg, then add ſyrup of maidenhair an ounce and an half, barley water a pint: the doſe, three or four table ſpoonfuls three times a day. Its title expreſſes its virtues.

Oily Emulſion.

Take of ſimple penny-royal water twelve ounces, oil of olives four ounces, ſyrup of maidenhair one ounce and an half, hartshorn drops two drachms; mix into an emulſion; the doſe the ſame as the former.

Common Clyſter.

Take of the common clyſter decoction of the London Diſpenſatory, twelve ounces, lenitive electuary one ounce, ſalt half an ounce, olive-oil two ounces; mix together for uſe.

Anodyne Clyſter.

Take of ſheeps-head broth five ounces, extract of opium three grains, diſſolve the opium thoroughly in the broth.

broth. A very powerful remedy against the dysentery; to be injected at discretion.

Demulcent Clyster.

Take white decoction five ounces, starch and Portuguese earth of each two drachms, the yolk of an egg; mix together for use. In a tenesmus or a dysentery, when the mucus is abraded from the bowels, this clyster may be administered with considerable advantage.

Turpentine Clyster.

Take of the common clyster decoction of the London Dispensatory, six ounces, Venice turpentine half an ounce, dissolve the turpentine in the yolk of an egg, then add four ounces of olive oil.

Expression of Hog-Lice.

Take of live hog-lice one ounce and an half, bruise them in a marble morter, and add gradually half a pint of simple penny-royal water, and an ounce of the simple syrup: the dose, two or three ounces night and morning. It is a great detergent, and of service in the jaundice, dropsy, asthma, and all chronic disorders that foul the glands.

Extract of the Brazilian Bark.

Take of the Brazilian bark in powder one pound, boil in ten pints of water for an hour or two, then pour off the liquor, and boil the remaining bark in ten pints of fresh water for the same length of time; once more pour off the liquor, and add more water; repeat the coction a fourth time; lastly mix these several liquors together, and evaporate the whole to the consistence of an extract, over a gentle fire.

Common Gargle.

Take of tincture of roses a pint, honey of roses two ounces; mix together.

Detergent Gargle.

Take of the emollient decoction a pint, tincture of myrrh half an ounce, honey one ounce and an half; mix for use. An excellent gargle in the putrid sore throat.

Aromatic Anodyne Draught.

Take of simple pepper-mint water one ounce and an half, aromatic tincture forty drops, London philonium a scruple, simple syrup a drachm. Its title expresses its virtues. It contains nearly half a grain of opium.

Diuretic Draught.

Take of spring water one ounce and an half, diuretic salt two scruples, oxymel of squills a drachm.

A stronger Diuretic Draught.

Take of simple penny-royal water one ounce and an half, lemon-juice six drachms, salt of wormwood half a drachm, tincture of cantharides fifteen drops, simple syrup two drachms: these draughts are to be repeated discretionally, where the use of powerful diuretics seems indicated.

Emetic Draught.

Take of carduus tea two ounces, ipecacoanha in powder half a drachm, oxymel of squills two drachms.

Stronger Emetic Draught.

Take of ipecacoanha wine of the London Dispensatory two ounces, emetic tartar two grains.

Saline Draught.

Take of spring water one ounce, salt of wormwood half a drachm, lemon-juice a sufficient quantity to saturate the salt perfectly, tincture of cinnamon two drachms, loaf-sugar a small lump: this draught may be taken every four or six hours.

Spermaceti Draught.

Take of barley water one ounce and

and an half, ſpermaceti (diſſolved in the yolk of an egg) half a drachm, nitre a ſcruple, ſimple ſyrup a drachm: to be taken every four or ſix hours. An elegant pectoral. Half a ſcruple of volatile ſalt of hartshorn may be added occaſionally.

Volatile Draught.

Take of ſpring water three ounces, volatile ſalt of hartshorn a ſcruple, ſpermaceti a drachm and an half, ſyrup of maidenhair two drachms; to be repeated diſcretionally.

Aloetic Infuſion.

Take of ſuccotrine aloes two drachms, pareira brava root four ſcruples, boiling water nine ounces, infuſe together, and when cold add half an ounce of compound ſpirits of lavender.

Bitter Infuſion.

Take zedoary, the yellow rind of lemons carefully ſeparated from the white inner rind, of each half an ounce; the yellow rind of Seville oranges alſo carefully ſeparated from the white inner rind, a drachm and a half, boiling water twelve ounces, infuſe together an hour or two, and then ſtrain off the liquor through flannel without preſſure for uſe: the dose three ounces two or three times in a day. An elegant and agreeable bitter.

The phyſicians of this hoſpital wholly reject gentian-root, not becauſe it poſſeſſes any noxious quality itſelf, but leſt the apothecary, through miſtake, ſhould uſe a poiſonous root, which very nearly reſembles it: they therefore in every compoſition wherever this root is an ingredient, ſubſtitute zedoary in its room; and inſtead of extract of gentian, uſe the extract of rue.

Diuretic Infuſion.

Take of zedoary root two drachms, dried ſquills, rhubarb, and juniper berries bruiſed, of each a drachm; cinnamon in powder three drachms, ſalt of wormwood a drachm and an half, infuſe in a pint and an half of old hock wine, and when fit for uſe filtre the liquor: the doſe about a gill two or three times in a day. A powerful diuretic and of excellent uſe in hydropic diſorders, and obſtructions of the urinary paſſages from viſcid humours.

Infuſion of Snake-root with Vinegar.

Take of ſnake-root powdered half an ounce, cochineal half a drachm, boiling water twelve ounces; let theſe ingredients infuſe together a ſufficient time: then ſtrain off the liquor and add thereto of diſtilled vinegar two ounces; the doſe four ſpoonfuls every four or ſix hours. A noble alexipharmic in contagious, petechial, and eruptive fevers.

Muſtard Infuſion.

Take of muſtard-ſeed bruiſed one ounce, Winter's bark in groſs powder half an ounce, infuſe cold in a pint of Liſbon wine: when fit for uſe ſtrain off the liquor, and add two ounces of compound ſpirit of lavender: the doſe the ſame as the former. It is an uſeful preſcription in rheumatic and paralytic caſes.

Aſtringent Milk.

Take of pomegranate ſhells bruiſed half an ounce, cinnamon bruiſed two drachms, boil in a pint of new milk; add by little and little, a pint of ſpring water; continue the coction till there remains but a pint of liquor. A quarter of a pint may be drank diſcretionally in hectic caſes, attended with a diarrhœa, or where a ſoft nutriment is required, and milk alone is apt to purge the patient.

Chalybeate Milk.

Take of ſalt of ſteel one ounce, gum arabic a drachm and an half, boiling water a pint, ſimmer them together a few minutes over a gentle fire. A good medicine in cachectic habits;

habits; and obſtructions of the menſes.

Acidulated Linctus.

Take of conſerve of roſes two ounces, weak ſpirit of vitriol four ſcruples, or rather a ſufficient quantity to render the conſerve agreeably tart. A tea-ſpoonful now and then is very proper to cleanſe the mouth when parched in fevers.

Common Linctus.

Take of conſerve of marſhmallows one ounce, oil of olives and ſyrup of marſhmallows, of each four ounces.

Solutive Linctus.

Take of conſerve of hips one ounce, oil of olives and ſolutive ſyrup of roſes, of each four ounces.

Oily linctuſſes are preſcribed in coughs, aſthmas, and pleuritic diſorders, to heal excoriations, and ſoften and relax the criſpy tone of the fibres.

Borax Liniment.

Take borax in powder, and oil of olives, of each equal parts, rub together in a marble morter till they are perfectly incorporated, and become of the conſiſtence of a liniment. This is uſed as a diſcutient application.

Aſtringent Mixture.

Take of ſimple cinnamon-water ten ounces, extract of the Brazilian bark three drachms. Three or four ſpoonfuls may be taken, three times a day, or after every looſe ſtool, obſerving the cautions laid down in the former part of this work, concerning aſtringents.

Peruvian Bark Mixture.

Take of the decoction of the Peruvian bark ten ounces, extract of the Peruvian bark two drachms, ſyrup of orange-peels one ounce: the doſe, two large ſpoonfuls, to be repeated every four hours, or diſcretionally, in intermittents and diſorders from a relaxed ſtate of the ſolids.

Purging Mixture.

Take of the infuſion of ſena of the London Diſpenſatory, ten ounces, tincture of ſena two ounces, tincture of jalap three drachms: three or four table ſpoonfuls are to be taken at a time, and repeated every hour or two, till a ſufficient number of ſtools are procured.

Nitrous Mixture.

Take of ſpring water ſix ounces, crabs-claws prepared, and nitre, of each a drachm and an half, ſyrup of elder ſix drachms. An excellent refrigerant. Two table-ſpoonfuls are to be taken every four or ſix hours.

Squill Mixture.

Take of ſimple cinnamon water eight ounces, vinegar of ſquills, and ſyrup of marſhmallows, of each three ounces. An efficacious diuretic, if adminiſtered in very ſmall doſes, frequently repeated, and is of vaſt ſervice in dropſical habits.

Valerian Mixture.

Take of ſimple pepper-mint water twelve ounces, powder of valerian-root one ounce, compound ſpirit of lavender half an ounce, ſyrup of orange-peel one ounce: three or four table-ſpoonfuls may be taken every ſix or eight hours. A noble medicine in every ſpecies of nervous diſorders.

Miſletoe Mixture.

Take of ſpring water twelve ounces, miſletoe in fine powder ſix drachms, ſyrup of orange-peels one ounce; its doſe is the ſame as the former, and it ſtands recommended as a great anti-epileptic.

Æthiopic Pills.

Take of æthiops-mineral two ounces, gum-aloes half an ounce, ſyrup of buckthorn a ſufficient quantity to form a maſs for pills; the doſe three or four middle ſized pills twice in a day. A good alterative.

Compound Aloetic Pills.

Take of ſuccotrine-aloes two ounces, ſcammony in powder half an ounce, ſalt of wormwood three drachms, ſyrup of buckthorn a ſufficient quantity to make the whole into a maſs. A briſk warm purgative, fit for phlegmatic habits: the doſe from a ſcruple to two ſcruples.

Antimonial Pills.

Take of precipitated ſulphur of antimony two drachms, calomel finely levigated, and gum guaiacum in powder, of each one ounce; ſyrup of buckthorn a ſufficient quantity to form a maſs. Make out of each drachm twelve pills, two of which may be taken night and morning, with a draught of the ſudorific decoction, the patient keeping himſelf moderately warm. This medicine is a very uſeful alterative, both in cutaneous and venereal diſorders.

Aſtringent Pills.

Take extract of the Brazilian-bark, and Japan earth, of each an ounce; St. Thomas's balſam a ſufficient quantity to form a maſs: twelve pills may be made out of each drachm; two or three of which may be taken diſcretionally in the fluor albus, old gleets, diarrhœas, &c. obſerving the uſual cautions when given for a diarrhœa.

Hiera-picra Pills, with Steel.

Take of hiera-picra one ounce, ſalt of ſteel ſix drachms, compound powder of aron-root, and extract of rue, of each one ounce and an half, ſolutive ſyrup of roſes, a ſufficient quantity to form a maſs. Two middle ſized pills may be taken night and morning, to promote digeſtion in languid habits, and in all caſes where warm aperient and deobſtruent medicines are proper.

Mercurial Pills.

Take of quickſilver five drachms, Venice turpentine two drachms, gum guaiacum three drachms, extinguiſh the quickſilver perfectly with the turpentine, which if too viſcid may be rendered thinner with a little oil of olives, then add the guaiacum and beat the whole together into a maſs for pills. Form twelve pills out of each drachm, two of which may be taken night and morning with a draught of diet drink, and will be of ſervice in all caſes that require mercurial alteratives.

Myrrh Pills with Steel.

Take of myrrh in powder ſix drachms, ſalt of ſteel two drachms, gum ammoniacum and extract of ſavin of each three drachms; beat into a maſs with the ſimple ſyrup: two middling ſized pills may be taken every night and morning in chlorotic caſes, and obſtructions of the menſes, for which they are very efficacious.

Soap Pills.

Take of Caſtile ſoap two ounces, gum ammoniacum one ounce and an half, ſquills in powder and rhubarb, of each three drachms; form into a maſs with the ſimple ſyrup: two middle ſized pills may be taken night and morning in the jaundice, aſthma, and all obſtructions of the viſcera, for which they are a very powerful remedy.

Storax Pills.

Take of ſtrained ſtorax two ounces, extract of elecampane one ounce, ſtrained opium one drachm, beat together into a maſs. Half a drachm of this maſs contains a full grain of opium: this compoſition is a powerful expectorant.

Antimonial Powder.

Take of crude antimony in fine powder one ounce, æthiops-mineral ſix drachms; rub them well together.

The

The dose half a drachm two or three times a day. This is an admirable medicine in all cutaneous foulnesses, even the worst leprosies. A vomit should be previously administered.

Astringent Powder.

Take of the Brazilian bark three ounces; Japan earth, cinnamon, and olibanum, of each five drachms; reduce them into a fine powder.

Astringent Powder with Opium,

Is made by adding a drachm of dried opium to the above ingredients, before they are reduced to powder.

Compound Powder of Portuguese Earth.

Take prepared Portuguese earth and gum-arabic, of each four ounces, cinnamon two ounces, reduce the whole into a fine powder.

Compound Powder of Portuguese Earth,

Is made by adding a drachm of dried opium to the above ingredients before they are powdered: the proper dose of the above powders, is from a scruple to half a drachm, to be repeated occasionally.

Purging Whey.

Take of Glauber's salt six drachms, dissolve in half a pint of water, and add a pint of new milk, then boil this mixture till one half has evaporated, and as soon as the curd has separated, strain off the whey, and add one ounce and a half of manna. A quarter of a pint may be taken discretionally.

Mindererus's Spirit.

Take of volatile spirit of sal ammoniac four ounces, distilled vinegar a sufficient quantity to perfectly neutralize the spirit. The vinegar should be added by degrees.

Syrup of Elder.

Take of the juice of elder-berries depurated, one pint, loaf-sugar two pounds, boil together over a slow fire, to the consistence of a syrup.

Troches of burnt Sponge.

Take of burnt sponge one ounce, loaf-sugar three ounces, make into troches with a sufficient quantity of the mucilage of gum tragacanth: these are contrived for scrophulous disorders in children.

Yellow Basilicon, with Red Precipitate.

Take of yellow basilicon half an ounce, olive-oil two drachms, red corrosive mercury finely levigated, a scruple, mix together into an ointment. The detergent application commonly used in all the hospitals.

THE

SUPPLEMENT.

Weights and Measures.

IN this book, Troy-weight is used in the composition of the medicines, divided in the following manner:

The pound	contains	twelve ounces,
The ounce		eight drachms,
The drachm		three scruples,
The scruple		twenty grains.

For Liquids, wine-measure is used, and is divided as follows:

The pint	contains	sixteen ounces,
The quart		eight drachms.

A gallon contains eight pints.
A spoonful is equal to the measure of half an ounce.

Alum Curd.

Take of the white of an egg at pleasure, and stir it in a pewter vessel with a sufficient lump of alum, till it is coagulated.

Suppurating Cataplasm.

Take of dried figs four ounces, of yellow basilicon one ounce, of strained galbanum half an ounce; beat well the figs with a little wine or strong stale beer; then carefully mix them in the ointment, first melted with the galbanum.

The preparation of terrestrious and such other bodies as will not dissolve in water.

These bodies are first to be pounded in a morter, then levigated with a little water upon a hard and smooth marble into an impalpable powder, afterwards dried upon a chalk-stone, and then set by for a few days in some warm, or at least a very dry, place.

After this manner are to be reduced into powder, amber; antimony; bezoar, which should be levigated with spirit of wine instead of water; blood stone; calamine, first calcined for the use of the makers of brass; chalk; coral; crabs-claws; crabs-eyes; egg-shells, first separated from the membrane adhering to them by boiling in water; oyster-shells, first cleansed; pearls, verdigris, tutty.

In antimony, calamine, and tutty, singular care ought to be taken to reduce them into the most subtile powder possible.

Cummin

Cummin Cataplasm.

Take of cummin seeds half a pound; bay berries, the leaves of water germander dried, Virginia snake root, of each three ounces; of cloves, one ounce; with honey, equal to thrice the weight of the species powdered, make a cataplasm.

Purification or trying of Hogs-Lard and Mutton-Suet.

Melt them by a gentle fire with the addition of a little water, after they have been first chopped into small pieces; and then strain them from the membranes intermixed.

Volatile Epithem.

Take equal weights of common turpentine and spirit of sal ammoniac; stir the turpentine in a morter, and gradually drop in the spirit, till the whole is reduced to a white mass.

Blistering Epithem.

Take of cantharides reduced to a very fine powder, and of wheat flour, equal weights; with a sufficient quantity of vinegar make them into a paste.

Purification of Vipers-Fat.

Melt the fat, first separated from the intestines, with a gentle heat and then strain it out through a thin cloth.

Mercurial Cerate.

Take yellow wax, tried hogs-lard, of each half a pound; quicksilver three ounces; the simple balsam of sulphur a drachm; melt the wax with the lard; then add them gradually to the quicksilver, first well divided by the balsam of sulphur.

Epulotic Cerate.

Take of oil olive a pound; yellow wax and prepared calamine, each half a pound: melt the wax with the oil, and, as soon as the mixture begins to congeal, sprinkle in the calamine and stir all well till the cerate is quite cold.

Clarifying of Honey.

Liquify the honey, by setting the vessel containing the honey into hot water, and let the scum that rises be taken off.

Yellow Cerate.

Take yellow basilicon half a pound, yellow wax an ounce; melt them together.

White Cerate.

Take oil olive four ounces in measure, white wax four ounces in weight, spermaceti half an ounce in weight; melt all together, and stir them well, till the cerate is quite cold.

Baking of Squills.

Inclose the squill in paste of wheat flour, having first separated the outer skin, and the hard part from which the fibrous roots grow; then bake the squill in an oven till the paste is dry, and the squill is rendered soft and tender throughout.

Volatile Liniment.

Take oil of almonds one ounce in measure, spirit of sal ammoniac the weight of two drachms; shake them together in a wide-mouthed phial till they perfectly unite.

Drying of Squills.

Cut the squill, after the outer skin has been taken off, transversely into thin slices, and dry it with a very gentle heat.

Liniment of three Ingredients.

Take of the common plaster four ounces in weight, oil olive four ounces in measure, vinegar the measure of one ounce; set them over a gentle fire, continually stirring them, till the liniment has acquired its due consistence.

Roasting

Roasting of Rhubarb and Nutmeg.

Roast them with a gentle heat, till they become easily friable into powder.

Saponaceous Liniment.

Take spirit of rosemary a pint, hard Spanish soap three ounces, camphor one ounce; digest the soap with the spirit of rosemary till it is dissolved; then add the camphor.

White Liniment.

Take oil olive three ounces in measure, spermaceti the weight of six drachms; melt all together with a gentle fire, briskly stir ing without intermission, till the mixture is become quite cold.

Burning of Sponge.

Heat the sponge in a covered vessel, till it becomes black, and is easily friable; then reduce it to powder in a glass or marble morter.

Green Ointment.

Take green oil three pounds, yellow wax ten ounces; melt the wax with the oil over a gentle fire, continually stirring till the mixture is cold.

Calcination of Hartshorn.

Burn pieces of hartshorn in a potter's furnace, till they become perfectly white; then reduce them to powder after the same manner as other terrestrious substances.

Ointment for Blisters.

Take tried hogs-lard and blistering plaster, equal weights; melt them together with a very gentle heat, and stir them well till fully cold.

Extraction of Pulps.

Pulpy fruits that are unripe, and those which are ripe, if dry, are to be boiled in a small quantity of water till they become soft; then the pulp is to be pressed through a strong hair sieve, and afterwards boiled over a gentle fire, and continually stirred to avoid burning, till it is brought to a due consistence.

Cassia is also to be boiled out from the pod or cane bruised, and reduced afterwards to a just consistence by evaporating the water.

The pulps of fruits, which are both ripe and fresh, are to be pressed out without any previous boiling.

Ointment of Tutty.

Take any quantity of prepared tutty, and mix with it as much purified vipers-fat as is requisite to bring it to the consistence of a soft ointment.

Ointment of three Ingredients.

Take of the common plaster four ounces in weight, oil olive two ounces in measure, vinegar one ounce in measure; set them together over a gentle fire, continually stirring them, till they are brought to the consistence of an ointment.

Ointment of Sulphur.

Take of the simple ointment half a pound, flowers of sulphur unwashed two ounces, essence of lemons a scruple; mix all together.

Lead Ointment.

Take oil olive half a pint, white wax an ounce and an half, sugar of lead two drachms; rub the sugar of lead, first brought to a very subtile powder, with some part of the oil; then add this to the wax melted with the rest of the oil, and stir the mixture till it is fully cold.

Ointment of Elder.

Take elder flowers full blown four pounds, tried mutton suet three pounds, oil olive one pound; boil the flowers, till they become almost crisp, in the suet and oil first melted together; then press them out.

Ointment, with Precipitate of Mercury.

Take of the simple ointment an ounce and an half, of precipitated sulphur

phur two drachms, white precipitate of mercury two ſcruples. Mix all together, and moiſten them with the ley of tartar, to bring the whole to the conſiſtence of an ointment.

Ointment of Tar.

Take tar, and tried mutton ſuet equal weights. Melt them together, and ſtrain, while hot.

Ointment of Gum Elemi.

Take tried mutton ſuet freſh, two pounds, gum elemi one pound, common turpentine ten ounces. Mix the gum with the ſuet, and all being removed from the fire, add forthwith the turpentine, and, while the mixture is fluid, ſtrain it.

Weaker blue Ointment.

Take tried hogs-lard four pounds, quickſilver one pound, common turpentine an ounce. Rub the quickſilver in a morter with the turpentine, till the quickſilver appears no longer; then add by degrees the lard warmed, and mix them diligently.

Stronger blue Ointment.

Take tried hogs-lard two pounds, quickſilver one pound, the ſimple balſam of ſulphur half an ounce. Rub the quickſilver with the balſam of ſulphur till the quickſilver no longer appears; then add by degrees the lard warmed, and carefully mix them.

Green Baſilicon.

Take yellow baſilicon eight ounces in weight, oil of olive three ounces in meaſure, prepared verdigris one ounce. Mix all into an ointment.

Straining of Storax.

Boil ſtorax in water till it becomes ſoft, then preſs it out between warm iron plates, and ſeparate the ſtorax now cleared of its dregs from the water.

Opium ſtrained.

Take opium cut into ſmall bits one pound weight, diſſolve it into a pulp, with one pint or leſs of boiling water, with care to avoid burning; and while it remains quite hot, preſs it ſtrongly through a linen cloth from its dregs; then reduce the ſtrained opium by a water balneum, or other ſmall heat, to its firſt conſiſtence.

Opium ſoftened in this ſmall quantity of water, paſſes the ſtrainer unaltered in its ſubſtance, and freed only from dregs; but if it be diſſolved in a large quantity of water, the gummy and reſinous parts will divide from each other.

After the ſame manner the reſt of the gums may be purified, ſuch as gum ammoniacum, aſſafœtida, galbanum, and the like. But a greater quantity of water may be ſafely uſed. If the reſinous part ſubſides, let it be taken out, and added towards the concluſion of the inſpiſſation, that it may unite with the reſt into one uniform maſs.

Any gum (as galbanum) which eaſily melts, may be purified by including the gum in a bullock's bladder, and retaining it in warm water, till the gum becomes ſoft enough to be ſeparated from its dregs, by preſſing through a canvas ſtrainer.

Preparation of Millepedes.

Let millepedes be incloſed in a thin canvas cloth, and ſuſpended within a covered veſſel, over the ſteam of hot ſpirit of wine, and they will ſoon be killed by the vapour, and be rendered friable.

Black Baſilicon.

Take oil olive a pint, yellow wax, yellow roſin, and common pitch, each nine ounces. Melt all together, and ſtrain the mixture while hot.

Yellow Baſilicon.

Take oil olive a pint, yellow wax, yellow roſin, and Burgundy pitch each,

each a pound, common turpentine three ounces. Melt the wax, rosin, and pitch, with the oil, over a gentle fire, then take them off, add the turpentine, and strain the mixture while it remains hot.

Ointment of Marshmallows.

Take the oil of mucilages, three pints, yellow wax one pound, yellow rosin half a pound, common turpentine two ounces. Melt the rosin and wax with the oil; then, these being taken off the fire, add the turpentine, and strain the mixture while it is hot.

Pomatum.

Take tried hogs lard two pounds, rose-water three ounces; pound the lard with the rose-water till they are well mixed; then melt the lard with a very gentle fire, and set it by a little while, that the water may subside; afterwards pour out the lard, and leave the water; then stir and beat the lard without ceasing, while it is growing cold, that it may be broke into as light and yielding a mass as may be; and then add as much essence of lemons as shall be requisite to give it an agreeable scent.

White Ointment.

Take oil olive one pint, white wax four ounces, spermaceti three ounces. Melt all together with a gentle heat, and stir them very briskly without ceasing, till they are fully cold.

Camphorated white Ointment.

This is made by adding to the former a drachm and an half of camphor, first beat with a few drops of oil of almonds.

Conserves

Of the leaves of garden scurvy-grass, spear-mint, rue, and wood sorrel, of the tops of sea-wormwood; of the flowers of lavender, mallows, rosemary, and red roses, while in bud, and of the outer yellow part of Seville orange peel.

The leaves are to be plucked from their stalks, and the flowers from their calixes; the outer rind of the orange peel should be scraped off with a rasp or grater; every one of them, when thus prepared, is to be pounded in a morter with a wooden pestle, first by itself, and then with the addition of three times its weight of double-refined sugar, till they are well incorporated together.

Conserve of Hips.

Take of the pulp of ripe hips one pound, double-refined sugar twenty ounces, and mix them into a conserve.

Conserve of Sloes.

Scald the sloes in water to soften them, taking care their skins are not broken; then take them out, and express their pulp, which mix with thrice its weight of double-refined sugar.

Blistering Plaster.

Take of the drawing plaster two pounds, cantharides one pound, vinegar half a pint. The plaster being melted, a little before it hardens, sprinkle in, and mix the cantharides, reduced to a very fine powder, then add the vinegar, and beat all well together.

Scorbutic Juices.

Take the juice of garden scurvy-grass a quart, the juice of brook-lime, and of water-cresses, of each one pint, the juice of Seville oranges a pint and a quarter. These being mixed, let them stand till the dregs subside, then let the juice be poured off clear, or strained.

Rob of Elder-Berries.

Let the depurated juice of elder-berries be inspissated with a gentle heat, to a proper consistence.

Elaterium

Elaterium.

Slit ripe wild-cucumbers, and pafs the juice, gently preffed out, through a very fine hair fieve into a glazed veffel; fet it by fome hours, till its thicker part fhall have fubfided: then pour off as much of the thin part of the juice, as can conveniently be done, by inclining the veffel, and draw away the reft by the filtre: let the thicker part which remains, be covered over with a linen cloth and dried, either in the fun or by a gentle fire.

Extracts of the Roots of Elecampane, Gentian, and black Helebore; and of the Leaves of Rue and Savin.

Boil them in water, ftrain and prefs out the decoction, and fet it by till its dregs are fubfided; then boil it to the confiftence of a pill, with care towards the end to avoid burning.

Extract of Liquorice.

Boil the roots of liquorice lightly in water, ftrain and prefs out the decoction; then, after its dregs have fubfided, boil it away, till it will not ftick to the fingers, ufing due care towards the end to avoid burning.

Extract of Logwood.

Take of logwood, in powder, one pound. Boil it four times, or oftener, in a gallon of water to half; then boil all the liquors, mixed together and ftrained, to a juft confiftence.

Extract of Peruvian Bark, both foft and hard.

Take of Peruvian bark, reduced to powder, one pound; of water, ten or twelve pints. Boil for an hour or two, and pour off the liquor, which will be red and tranfparent; but as foon as it grows cold, becomes yellow and turbid: boil the bark again in the fame quantity of frefh water as before, repeating thefe boilings till the liquor remains tranfparent when cold; then evaporate all thefe decoctions, ftrained and mixed together, to the proper confiftence, over a gentle fire, with due care to avoid burning.

This extract is to be prepared under a double form; one, of the confiftence of a pill; the other, hard enough to be reduced to a powder.

Extract of Lignum Vitæ, foft and hard.

Take of the fhavings of lignum vitæ one pound, boil them four times, or oftener, in a gallon of water to half; then infpiffate the liquors, after they have been ftrained: but when the water is near all dried away, add a fmall portion of rectified fpirit, by which the extract will be brought to an uniform and tenacious mafs.

This extract is alfo to be prepared under two forms, one fofter and the other harder.

Extract of Jalap.

Pour upon jalap root powdered, rectified fpirit of wine, and with a due heat draw a tincture, and boil the refidue feveral times in water: after ftraining, draw off the fpirit from the firft tincture, till it begins to thicken; infpiffate alfo the ftrained decoctions; then mix the two extracts, and, with a gentle fire, reduce them to the confiftence of a pill.

The Cathartic Extract.

Take fuccotrine aloes an ounce and an half; of the pith of coloquintida fix drachms; fcammony, and the leffer cardamom feeds hufked, of each half an ounce; of proof fpirit a pint: the fpirit being poured upon coloquintida cut fmall, and the feeds bruifed, draw a tincture with a gentle heat continued four days; then, to the tincture preffed out, add the aloes and fcammony, firft feparately reduced to powder; and, thefe being diffolved, draw off the fpirit,

and reduce the mafs to eth confiftence of a pill.

The Gum and Refin of Aloes.

Take fuccotrine aloes four ounces, of water a quart; boil the aloes till it is diffolved as much as may be, and fet all by for a night: the refin will be precipitated to the bottom of the veffel: the liquor poured off or ftrained, being evaporated, will leave the gum.

Oil of Almonds.

Let either fweet or bitter almonds that are frefh, be poured in a ftone morter, and then the oil forced out with a prefs not heated.

After the fame manner fhould the oil be preffed from linfeed and mufard-feed.

Effential Oils

From the root of faffafras, from the leaves of fweet marjoram, wild marjoram, peppermint, fpearmint, penny-royal, rofemary, rue, favine, and wormwood; from the flowers of camomile and lavender, from the feeds of annife, carraway, cummin, and dill; from juniperberries, and from the fpices, cloves, nutmeg, and others.

Thefe oils are obtained by diftillation, with an alembic and refrigeratory. Water muft be added to the materials, in fufficient quantity to prevent their burning, and the fubject be macerated in that water a little time before the diftillation. The oil comes over with the water, and either fwims on the top, or finks to the bottom, according as it is heavier or lighter.

Oil of Box.

Diftil pieces of box in a retort with a fire gradually raifed: the oil will come over with an acid fpirit, from which the oil is to be feparated by a funnel.

Oil of Bricks.

Let bricks heated red hot, be plunged into oil olive, till the whole is imbibed; then the bricks being fufficiently broke, are to be put into a retort, and, by a fand heat, the oil will afcend, with a fpirit, which is to be feparated from the oil.

Oil of Barbadoes Tar.

Let Barbadoes tar be diftilled in a fand heat, and oil will afcend with a fpirit.

Oil of Turpentine.

Turpentine is to be diftilled with water in a copper ftill, like the effential oils of vegetables.

After diftillation, remains in the ftill yellow rofin.

This oil is often, though improperly, called fpirit of turpentine.

The Etherial Oil, and the Balfam of Turpentine.

Let oil of turpentine be diftilled in a retort with a very gentle heat, till what remains is become of the confiftence of a balfam.

Balfam of turpentine may alfo be diftilled from yellow rofin, whence, after a portion of oil, which muft be removed in time, will come a thick balfam; a blackifh rofin remaining in the retort, which is alfo called colophony.

Compound Oil of Balfam of Copaiva.

Take of balfam of copaiva two pounds, gum guaiacum four ounces. Diftil them together in a retort.

Purified Nitre.

Boil nitre in water, and ftrain the water through bloffom paper; then, after due evaporation, fet it by in a cold place, that the nitre may fhoot.

In the fame manner is purified falammoniac.

Burnt

Burnt Alum.

Let alum be put into an iron or earthen veſſel, and calcined as long as it riſes up and ſwells.

Calcined Vitriol.

Put green vitriol into an earthen veſſel, and calcine it with an open fire as long as it exhales any moiſture, then take it out by breaking the veſſel, and ſet it by for uſe, well cloſed from the air. The vitriol is moſt perfectly calcined, if, at the bottom and ſides of the veſſel containing it, it is become red.

Salt of Wormwood.

Let the aſhes of wormwood be put into an iron pot, and kept red-hot by a ſtrong fire for ſome hours, often ſtirring them, that all remains of oil may be burnt out, then boil them in water; ſtrain the water, which will be impregnated with the ſalt, through paper, and evaporate it to dryneſs.

In this manner is to be prepared the fixed alkaline ſalt of any plant, whoſe aſhes will yield that kind of ſalt.

Salt of Tartar.

Wrap up any ſpecies of tartar in ſtrong brown paper, firſt made wet, or incloſe it in a proper veſſel, and expoſe it to the fire, that its oil may be burnt out, then boil it in water, and collect its ſalt as before.

Ley of Tartar.

When the tartar is calcined white, let it be put in a damp place, that it may liquify by the moiſture of the air.

Soluble Tartar.

Take of any alkaline fixt ſalt, a pound, water a gallon. The ſalt being diſſolved in the water boiling, throw in cryſtals of tartar in powder, as long as any fermentation is raiſed, which uſually ceaſes before thrice the weight of the alkali is thrown in; then ſtrain the liquor through paper, and after due evaporation ſet it by, for the ſalt to chryſtallize, or elſe evaporate the liquor wholly away, that the ſalt may be left dry.

Soap Lys.

Take equal weights of Ruſſia potaſh and quick lime, and throw water upon them by degrees, till the lime is ſlaked, then throw on more water, and ſtir altogether, that the ſalt of the aſhes may be diſſolved; after ſome time pour the liquor (filtred through paper, if needful) into another veſſel. A true ſtandard wine pint of this liquor, meaſured with the greateſt exactneſs, ought to weigh juſt ſixteen ounces: if it is heavier, for every drachm it exceeds that weight, an ounce and an half of water in meaſure, is to be added to each pint of the liquor; but if it is lighter, it muſt be boiled till the like quantity of water is carried off, or elſe muſt be thrown upon freſh lime and aſhes.

Almond Soap.

Take any quantity of freſh oil of almonds, and thrice its meaſure of the ſoap-leys. Digeſt them together for ſome time, in ſuch a heat wherewith the mixture ſhall but juſt boil, and within a few hours the oil and leys will be united; after which the liquor in boiling will ſoon become ropy, and in a good degree tranſparent, and will cool into the conſiſtence of a jelly; then throw in ſea-ſalt till the boiling liquor has loſt its ropineſs; continue the boiling, till drops of the liquor being received upon a tile, the water is ſeen to ſeparate freely from the coagulated ſoap; then remove the fire, and the ſoap will gradually riſe to the top of the liquor, which is to be taken out before it is cold, and put into a wooden frame, which has a cloth for its bottom: in the laſt place, being taken out, it is to be ſet by, till it acquires its juſt conſiſtence.

After

After the same manner may soap be made with oil olive, in which the finest oil ought to be employed, that the soap may be as little ungrateful, either to the palate or stomach, as possible.

The common stronger Caustic.

Boil to a fourth part any quantity of the soap-leys above described; then sprinkle in, while boiling, lime that has been kept in a vessel pretty close stopped for several months; continue to add this lime, till all the liquor is absorbed, and the whole reduced to a paste, which is to be kept in a vessel well stopped.

Common milder Caustic.

Take soft soap and fresh quick-lime, equal parts, and mix them at the time of using.

Spirit of Vinegar.

Let vinegar be distilled with a gentle heat as long as the drops fall free from any empyreuma.

If some part of what comes first off be thrown away, what is reserved will be stronger.

Diuretic Salt.

Take of any alkaline fixed salt one pound, and boil it in four or five pints of distilled vinegar with a very gentle heat; when the fermentation ceases, add more distilled vinegar; and when the fermentation arising from the addition is over, pour on another quantity of the like vinegar; and proceed thus till the vinegar being near all evaporated, fresh vinegar will not excite any fermentation; which will generally happen by the time about ten quarts of vinegar shall have been used; then gently evaporate to dryness. The salt left will be impure, which is to be melted for a time, but not too long, with a gentle heat, afterwards dissolved in water, and transcolated through paper. If the melting has been rightly performed, the strained liquor will be limpid and colourless, like water, but otherwise brownish. Lastly, the water is to be evaporated with a very gentle heat in a shallow vessel; the salt, as it dries, being frequently stirred, that the humidity may the sooner be discharged. This salt must be kept in a close vessel, that it may not run by the moisture of the air.

The salt ought to be very white, and should dissolve wholly, either in water or spirit of wine, without leaving any fæces. If the salt, though ever so white, leave in spirit any fæces, after it is dissolved in this spirit, it is to be filtred through paper, and dried again.

The weak and strong Spirit of Vitriol, also the Colcothar.

Vitriol, first calcined, is to be distilled in earthen vessels for three days without intermission, in a reverberatory heat: the liquor drove off being distilled over again in a glass retort, with a sand heat, the weak spirit will ascend, the strong remaining behind, which is usually, though improperly, called oil of vitriol.

What remains in the earthen vessels after the first distillation, is called the colcothar of vitriol.

Glauber's Spirit of Nitre.

Take of nitre three pounds, strong spirit of vitriol one pound: let them be mixed with caution, and gradually, under a chimney: afterwards let them be distilled, first with a gentle heat, and then with a stronger.

Glauber's Spirit of Sea Salt.

Take sea salt and strong spirit of vitriol, each two pounds, water one pint: the oil and water being first mixed together, add the mixture gradually to the salt, under a chimney; then distil, first with a small, and afterwards with a stronger fire.

Aqua-fortis.

Take nitre, and green vitriol not calcined, each three pounds; of the same

ſame vitriol calcined, a pound and an half: mix all well together, and diſtil with a very ſtrong fire as long as red fumes ariſe.

Compound Aqua-fortis.

Take aqua-fortis ſixteen ounces in weight, ſalt one drachm: diſtil to dryneſs.

Salt of Vitriol.

Take white vitriol a pound, ſtrong ſpirit of vitriol an ounce in weight, water as much as is ſufficient: diſſolve the vitriol by boiling, then ſtrain the decoction through paper, and after proper exhalation ſet it in a cold place, that the ſalt may ſhoot.

Vitriolated Tartar.

Take green vitriol the weight of eight ounces, water two quarts: the vitriol being diſſolved in the water boiling, throw in ſalt of tartar, or any other fixed alkali, till all fermentation ceaſes, which uſually happens after throwing in four ounces, or ſomething more, of the alkaline ſalt: then ſtrain through paper, and evaporate duly, that the ſalt may cryſtallize.

Vitriolated Nitre.

Diſſolve the cake left after the diſtillation of Glauber's ſpirit of nitre, as deſcribed above, in hot water, and after purifying through paper, evaporate, that the ſalt may ſhoot.

Glauber's Cathartic Salt.

Diſſolve in water the cake which remains after the diſtillation of Glauber's ſpirit of ſea ſalt: purify the ſolution through paper, and then duly evaporate it, that the ſalt may cryſtallize.

Spirit of Sea Salt coagulated.

Pour gradually upon ſpirit of ſea ſalt the lixivium of any fixed alkali, till all fermentation ceaſes, and then evaporate to dryneſs.

Dulcified Spirit of Vitriol.

Take of the ſtrong ſpirit of vitriol, called the oil, one pound; of rectified ſpirit of wine, one pint.

Dulcified Spirit of Nitre.

Take of rectified ſpirit of wine one quart, of Glauber's ſpirit of nitre half a pound; mix them by pouring the ſpirit of nitre on the other, and diſtil the mixture with a gentle heat, as long as what comes off will not raiſe any fermentation with a lixivial ſalt.

Spirit of Sulphur by the Bell.

Let ſulphur be ſet on fire under a glaſs veſſel fitted for this purpoſe, which is uſually called a bell, and the acid ſpirit will drop from it, which is to be received into a diſh placed underneath.

Spirit, Salt, and Oil of Amber.

Let amber be diſtilled by a ſand heat, gradually increaſed; from it will ariſe a ſpirit, oil, and ſalt, foul by a mixture of the oil.

The oil diſtilled again will part into a thinner oil, which will aſcend, and a thicker part remain, called the balſam of amber.

The ſalt is to be boiled either in the ſpirit, or water, and ſet by to ſhoot: thus it will be freed from its oil, and the oftner this proceſs is repeated, the purer will the ſalt be.

Spirit, Salt, and Oil of Hartſhorn.

Diſtil fragments of hartſhorn with a fire gradually raiſed to a great height: a ſpirit, ſalt, and oil, will aſcend.

If the oil be ſeparated, and the ſpirit and ſalt mixed together, be diſtilled again with a very gentle heat, they will both riſe more pure. If this is carefully repeated ſeveral times, the ſalt will become very white, and the ſpirit as limpid as water, with a grateful ſmell.

If

If the ſalt be ſeparated from the ſpirit, and ſublimed, firſt from an equal weight of fine chalk, and then again from a ſmall quantity of rectified ſpirit of wine, it will become ſooner pure.

Calcined hartshorn is, for the moſt part, made by burning the horns, after they have paſſed through the preceding operation.

After the ſame manner a ſpirit, ſalt and oil, may be diſtilled from any animal ſubſtance.

The Spirit, Salt, and Oil of Soot.

Diſtil wood ſoot in the ſame manner as hartshorn; but here more labour is required to render the ſpirit and ſalt pure.

Volatile Salt of Sal Ammoniac.

Take of the fineſt chalk or whiting two pounds, of ſal ammoniac one pound; ſublime the volatile ſalt in a retort with a ſtrong fire.

Spirit of Sal Ammoniac.

Take of any fixed alkaline ſalt a pound and an half, of ſal ammoniac a pound; of water, two quarts: with a gentle fire diſtil off one quart.

Dulcified Spirit of Sal Ammoniac.

Take of any fixed alkaline ſalt half a pound, of ſal ammoniac four ounces, of proof ſpirit three pints; diſtil off, with a gentle fire, a pint and an half.

Fœtid Volatile Spirit.

Take of any fixed alkaline ſalt a pound and an half, of ſal ammoniac a pound, of aſſafœtida four ounces, of proof ſpirit three quarts; diſtil off with a gentle heat five pints.

Aromatic Volatile Spirit.

Take eſſence of lemons, and eſſentiol oil of nutmegs, of each two drachms, eſſential oil of cloves half a drachm, dulcified ſpirit of ſal ammoniac a quart. Diſtil with a very gentle fire.

Flowers of Benjamin.

Put powdered Benjamin into an earthen pot placed in ſand, and with a ſmall heat the flowers will riſe, and may be caught by a paper cone placed over the pot.

Or elſe the Benjamin may be put into a retort, and the flowers will aſcend into, and faſten themſelves upon its neck.

The flowers, if tinged yellow, are to be mixed with tobacco-pipe clay, and ſublimed again.

Flowers of ſulphur.

Let ſulphur be ſublimed in a fit veſſel; and any part of the flowers, which may have concreted, are to be reduced to powder by a wooden mill, or in a marble morter with a wooden peſtle.

Flowers of Sulphur waſhed.

Pour water on the flowers, to the height of three or four fingers above them, and boil them for a time; then pour off this water, and with freſh cold water waſh the remains of this away; then dry the flowers for uſe.

Simple Balſam of Sulphur.

Boil flowers of ſulphur in four times their weight of oil olive, in a pot lightly covered, till the oil and ſulphur are joined into the conſiſtence of a balſam.

In the ſame manner is a balſam of ſulphur alſo prepared with Barbadoes tar.

Precipitated Sulphur.

Boil flowers of ſulphur with thrice their weight of quick lime, till the ſulphur is diſſolved, and filtre the ſolution through paper; then with weak ſpirit of vitriol make a precipitation, which is to be often waſhed, till it is become quite inſipid.

Sulphurated

Sulphurated Water.

Take water a quart, sulphur half a pound. Let some portion of the sulphur, set on fire in an iron ladle, be suspended over the water in a close vessel; and let this be repeated as often as the fumes from the last sulphur subside, till the whole is burnt away.

Rust of Steel prepared.

Expose filings of steel to the air, and moisten them sometimes with water or vinegar, till they are turned into rust; then rub them in a mortar, and by pouring on water, wash off the finest powder; the residue, which by moderate rubbing was not brought to a powder fine enough to be washed off, is again to be exposed moist to the air, and when farther rusted, to be treated as before. The powder thus washed off, is to be dried and kept for use.

Steel prepared with Sulphur.

Touch the steel, heated to a white heat, with a roll of brimstone, that the steel may melt, and drop into water placed under it. Then let it be separated from the sulphur, which has dropped along with it into the water, and be reduced into the finest powder.

Martial Flowers.

Take washed colcothar of green vitriol, or of iron filings, one pound, sal ammoniac two pounds. Mix and sublime them in a retort, and mixing again the bottom with the flowers, renew the sublimation, till the flowers acquire a beautiful yellow colour.

To the residue may be added half a pound of fresh sal ammoniac, and the sublimation repeated; and the same process may be thus continued on, as long as the flowers rise duly coloured.

Ley of Iron.

Set by the residue after the foregoing sublimation, in a damp place, that it may liquify by the air.

Salt of Iron.

Take the strong spirit, or oil of vitriol, the weight of eight ounces, filings of iron four ounces, water a quart. Mix them, and when the ebullition has ceased, set the mixture some time upon a sand heat; then filtre the liquor through paper, and evaporate it, that the salt may crystallize.

The lunar caustic.

Dissolve pure silver by a sand heat in about twice its weight of aqua-fortis; then dry away the humidity with a gentle fire; afterwards melt it in a crucible, that it may be poured into proper moulds, carefully avoiding over much heat, lest the matter should grow too thick.

Sugar of Lead.

Boil cerus in distilled vinegar, in a leaden vessel, till the vinegar is sufficiently sweet; then filtre the vinegar through paper, and after due evaporation, set it by, that the salt may shoot.

The Medicinal Stone.

Take alum, litharge, and bole-armenic, or French bole, of each half a pound; of the colcothar of green vitriol three ounces, of vinegar a quarter of a pint. Dry the whole mixed together over a fire, till it grows hard.

Powdered Tin.

Let melted tin be poured into a wooden box chalked within, and while the tin grows cold, let the box be briskly shaken, and part of the tin will be reduced to powder. The remainder, by being treated in the same way, may also be reduced to powder.

The

The purification of Quickſilver.

Diſtil the quickſilver in a retort, and then waſh it well with water and ſalt, or vinegar.

Moſaic Gold.

Take of tin one pound, of flowers of ſulphur ſeven ounces, ſal ammoniac and purified quickſilver, of each half a pound. Add the quickſilver to the tin melted; when the mixture is cold reduce it to powder; mix well with it the ſulphur and ſal ammoniac, and ſublime the compound in a matras. The Moſaic gold will be found under the part ſublimed, with a ſmall quantity of foulneſs at the bottom.

Æthiops Mineral.

Take equal parts of quickſilver purified, and flowers of ſulphur unwaſhed. Rub them together in a mortar of glaſs or marble, till the quickſilver perfectly diſappears, and the union is perfected.

Artificial Cinnabar.

Take purified quickſilver twenty-five ounces, ſulphur ſeven ounces; ſtir the quickſilver into the ſulphur melted, and if the mixture takes fire, it is to be extinguiſhed by covering the veſſel: then let the matter be reduced to powder, and ſublimed.

Corroſive Sublimate.

Take purified quickſilver forty ounces, ſea-ſalt thirty-three ounces, nitre twenty-eight ounces, calcined green vitriol ſixty-ſix ounces: rub the quickſilver firſt with about an ounce or more of corroſive ſublimate in a wooden or ſtone veſſel, till it breaks into ſmall grains; then mix it with the nitre, afterwards with the ſea-ſalt, till the quickſilver quite diſappears; laſtly, add the calcined vitriol, but do not rub the mixture too long with it, leſt the quickſilver ſhould begin to part again. Sublime the mixture in a matras, to which may be fitted an alembic head, that a ſpirit which will aſcend in a ſmall quantity may be ſaved.

Dulcified Mercury Sublimate.

Take corroſive ſublimate one pound, purified quickſilver nine ounces: add the quickſilver to the ſublimate reduced to powder, and in a glaſs matras digeſt them together in a gentle ſand heat, often ſhaking the glaſs, till they are united. Then augmenting the heat, ſublime the mixture. After an acrid part on the top of the ſublimation is ſcraped off, and if any globules of quickſilver chance to appear, they likewiſe being ſeparated, the maſs ſublimed is to be reduced to powder, and ſublimed again; the ſublimation is to be ſix times repeated.

Calcined Quickſilver.

Set quickſilver purified upon a ſand-heat for ſeveral months, in a glaſs veſſel with a broad bottom, and opening to the air by a ſmall hole, till it is reduced to a red powder.

White precipitate Mercury.

Take of ſal ammoniac and corroſive ſublimate, equal weights. Diſſolve them together in water, filtre the ſolution through paper, and with a ſolution of ſome alkaline fixed ſalt, make a precipitation; then waſh off all acrimony from the precipitated powder.

The Mercurial Red Corroſive.

Take of quickſilver purified, and of the compound aqua-fortis, equal weights. Set them together in a flat-bottomed glaſs, upon a ſand-heat, till all humidity is exhaled, and the dry maſs has acquired a red colour.

Coralline Mercury.

Pour upon the mercurial red corroſive, thrice its weight of rectified ſpirit

spirit of wine, and digest them together two or three days, in a gentle heat, often shaking the vessel; then set fire to the spirit, stirring the powder continually till the spirit is quite burnt away.

Yellow Mercurial Emetic.

Pour upon purified quicksilver in a glass vessel, double its weight of the strong spirit of vitriol. Let the liquor heat gradually, and then boil, till in the bottom of the glass there remains a white mass, which is to be perfectly dried with a strong heat. This, upon the effusion of warm water, will turn yellow, and fall into powder. Rub this powder and the warm water diligently together in a glass mortar; then, when the powder has subsided, pour off this water, and wash the powder often with fresh water, till it is become perfectly free from all acrimony.

The precipitated Sulphur of Antimony.

Take of antimony sixteen ounces, of tartar a pound, of nitre half a pound. Being separately reduced to powder, mix them well, and then throw them by degrees into a crucible red hot, and melt the mixture with a strong fire; then put it out into a conical mould, that the metallic part, commonly called the regulus of antimony, may fall to the bottom, while the scoriæ float at top. Dissolve these scoriæ in water, and filtre the solution through paper, then precipitate the sulphur, by dropping in spirit of sea-salt, and afterwards wash it with water from the salts adhering.

Crocus of Antimony.

Take of antimony and nitre, equal weights. Being separately reduced to powder, let them be well mixed, and then gradually thrown into a hot crucible to melt; the matter being poured out, is to be separated from its scoriæ. It will not always appear of the same colour; it is the more yellow the longer it has been melted.

Washed Crocus of Antimony.

Boil the crocus of antimony, reduced to a very fine powder, in water; and this water being poured away, wash the powder often with hot water, till the water comes off insipid.

Emetic Tartar.

Take washed crocus of antimony, and crystals of tartar, of each half a pound; of water three pints. Boil them together for half an hour, then filtre the water through paper, and after due evaporation set it by, that the salt may crystallize.

Calx of Antimony.

Let antimony in powder be well mixed with thrice its weight in nitre, and thrown by degrees into a crucible moderately heated; then being removed from the fire, let it be washed in water, both from the adhering salts, and from what coarser parts may have been less perfectly calcined than the rest.

Antimonial Caustic.

Take of antimony one pound, of corrosive sublimate two pounds. Being reduced separately into powder, mix them well, and distil them in a retort with a wide neck, in a gentle heat of sand. Let what ascends into the neck of the retort, be exposed to the air, that it may run into a liquor.

Cinnabar of Antimony.

Sublime the remains of the former process in a coated bolt-head with an open fire.

Simple Alexiterial Water.

Take of the green leaves of spearmint a pound and an half, the tops of sea wormwood, likewise green, the green leaves of angelica, of each a

pound; of water as much as is sufficient to prevent burning. Distil off three gallons.

Water of Dill-seed.

Take of dill-seed one pound, of water as much as is sufficient to prevent burning. Distil off a gallon.

The simple distilled Water of Orange-Peel.

Take of the outward yellow rind of fresh Seville-oranges, four ounces, of water as much as is sufficient to prevent burning. Distil off a gallon.

Water of Castor.

Take of Russia castor one ounce, of water as much as is sufficient to prevent burning. Distil off a quart.

Simple Cinnamon Water.

Take of cinnamon one pound, of water as much as is sufficient to prevent burning. Distil off a gallon.

Fennel Water.

Take of the seeds of sweet fennel a pound, of water as much as is sufficient to prevent burning. Distil off a gallon.

Simple Pepper-mint Water.

Take of the leaves of pepper-mint, dried, a pound and an half; of water as much as is sufficient to prevent burning, Distil off a gallon.

Simple Spear-mint Water.

Take of the leaves of spear-mint, dried, a pound and a half, of water as much as is sufficient to prevent burning. Distil off a gallon.

Water of Jamaica Pepper.

Take of Jamaica pepper half a pound, of water as much as is sufficient to prevent burning. Distil off a gallon.

Simple Penny-royal Water.

Take of the leaves of penny-royal, dried, a pound and an half, of water as much as is sufficient to prevent burning. Distil off a gallon.

Damask Rose-Water.

Take of fresh damask roses six pounds, of water as much as is sufficient to prevent burning. Distil off a gallon.

Spirituous alexiterial Water.

Take of the green leaves of spear-mint half a pound, the leaves of angelica green, the tops of sea wormwood green, of each four ounces; of proof-spirit one gallon, of water as much as is sufficient to prevent burning. Distil off one gallon.

Spirituous alexiterial Water, with Vinegar.

Take the green leaves of spear-mint, the leaves of angelica likewise green, of each half a pound; of the tops of sea wormwood green, four ounces; of proof-spirit one gallon; of water, as much as is sufficient to prevent burning. Distil off one gallon, and then add one pint of vinegar.

Compound Anniseed-Water.

Take anniseeds and angelica seeds, of each half a pound; of proof-spirit a gallon; of water as much as is sufficient to prevent burning. Distil off a gallon.

Spirituous Water of Orange-Peel.

Take of the outward yellow rind of fresh Seville-oranges half a pound, of proof-spirit a gallon, of water as much as is sufficient to avoid burning. Distil off a gallon.

Water of Cardamom-seeds.

Take of the lesser cardamom-seeds, husked, four ounces, of proof-spirit a gallon, of water as much as is sufficient

ſufficient to prevent burning. Diſtil off a gallon.

Spirituous Cinnamon Water.

Take of cinnamon a pound, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Compound Juniper Water.

Take of juniper-berries a pound, carraway-ſeeds, ſweet fennel-ſeeds, of each an ounce and a half, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Spirituous Water of Pepper-mint.

Take of the leaves of pepper-mint, dried, a pound and a half, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Spirituous Spear-Mint Water.

Take of the leaves of ſpear-mint, dried, a pound and a half, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Nutmeg-Water.

Take of nutmeg two ounces, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Spirituous Penny-royal Water.

Take of the leaves of penny-royal dried, a pound and a half, of proof-ſpirit a gallon, of water as much as is ſufficient to prevent burning. Diſtil off a gallon.

Compound Water of Horſe-radiſh.

Take of the freſh leaves of garden ſcurvy-graſs four pounds, freſh horſe-radiſh root, the outer yellow rind of freſh Seville-oranges, of each two pounds; of nutmegs nine ounces, of proof-ſpirit two gallons, of water as much as is ſufficient to prevent burning. Diſtil off two gallons.

Simple Spirit of Lavender.

Take of freſh lavender flowers a pound and a half, of proof-ſpirit a gallon. Diſtil off in a water balneum five pints.

Spirit of Roſemary.

Take of freſh roſemary tops a pound and a half, of proof-ſpirit a gallon. Diſtil off in a water balneum five pints.

Compound Spirit of Lavender.

Take of ſimple ſpirits of lavender three pints, of ſpirit of roſemary one pint, cinnamon and nutmeg, of each half an ounce, of red ſanders three drachms. Digeſt them together, and then ſtrain off the ſpirit.

Common Decoction of Clyſters.

Take of mallow-leaves dry, one ounce, dried camomile flowers, ſweet fennel ſeeds, of each half an ounce, of water one pint. After boiling, ſtrain it off.

Pectoral Decoction.

Take of common barley, raiſins ſtoned, and figs, of each two ounces; of liquorice-root half an ounce, of water two quarts. Boil the water firſt with the barley, then add the raiſins, aud afterwards, toward the latter end of the decoction, the figs and liquorice; the decoction being fully ended when one quart only of liquor will be left after ſtraining.

Barley Water.

Take of pearl-barley two ounces, of water two quarts. Waſh the barley firſt well with ſome cold water, then, pouring on half a pint of water, boil it a little while, and this water, which will be coloured, being thrown away, put the barley into the quantity of water above directed,

rected, first made boiling hot, and boil away to half.

Common Fomentation.

Take the leaves of southernwood, or of lavender-cotton, dry; the tops of sea wormwood also dry, dried camomile flowers, of each one ounce, of bay leaves dry half an ounce, of water three quarts. After a light boiling strain the water off.

Viper Broth.

Take a viper of middle size, without the skin, head, or entrails, of water a quart. Boil to about a pint and a half, remove all from the fire, and when the water is cold, if the viper be not a dried one, take away the congealed fat. Then take a chicken of a middle size, drawn, and the skin with all the fat taken off, and put it whole into this decoction while cold, set it upon the fire till it boils; then remove it from the fire, take out the chicken, cut the flesh of it into small pieces, which put again into the water, and set it over the fire, but as soon as it begins to boil up, pour it off, first having taken away whatever scum may have arisen.

Mucilage of Quince-seed.

Take of quince-seeds a drachm, of water six ounces. Boil with a gentle fire, till the water becomes ropy, resembling the white of an egg, then strain it through a linen cloth.

Alum Whey.

Take of cows-milk one pint, of alum in powder three drachms. Boil till the whey is formed, which is to be well separated from the curd.

Scorbutic Whey.

Take of cows-milk one pint, of the scorbutic juices a quarter of a pint. Boil till a whey is formed, which is to be well separated from the curd.

Simple Bitter Infusion.

Take gentian root, the yellow rind of lemon-peel, fresh, carefully separated from the inner white part, of each half an ounce; of the yellow rind of Seville orange-peel, also carefully separated from its inner white part, but dried, a drachm and an half; of boiling water three quarters of a pint. After infusing for an hour or two, strain it either through paper or a cloth, without any pressing out.

Purging Bitter Infusion.

Take the leaves of sena, the yellow rind of fresh lemon-peel, of each three drachms; gentian root, the yellow part of Seville orange-peel, dried, the lesser cardamom seeds husked, of each half a drachm, of boiling water five ounces. After infusing till the liquor is cold, strain it off.

Common Infusion of Sena.

Take the leaves of sena an ounce and an half, of crystals of tartar three drachms, of the lesser cardamom seeds husked two drachms, of water one pint. Boil the crystals of tartar in water, till they are dissolved, then pour the water, while boiling hot, upon the sena and the rest. When the liquor is cold, strain it off.

The Infusion of Sena with Lemon.

Take of the leaves of sena one ounce and an half, of the yellow of fresh lemon-peel an ounce in weight, of lemon-juice, an ounce in measure, of boiling water one pint. Infuse till cold, and then strain.

Simple Lime Water.

Take of quick-lime one pound, of water a gallon and an half. Pour the water on gradually, and after the ebullition

ebullition is over, let the lime subside, and the liquor be filtred through the paper.

The less compound Lime-water.

Take of liquorice one ounce, of sassafras bark half an ounce, of simple lime-water three quarts. Infuse two days without heat, and then strain off the liquor.

The more compound Lime-water.

Take of the raspings of lignum-vitæ half a pound; of liquorice one ounce, of sassafras bark half an ounce, of coriander-seeds three drachms, of simple lime-water three quarts. Infuse as before, and then strain off.

Tincture of Roses.

Take of red-rose buds, the white heels being cut off, half an ounce, of the strong spirit of vitriol, called the oil, one scruple, of boiling water two pints and an half, of double-refined sugar an ounce and an half. First add the spirit of vitriol to the water, in a vessel of glass or earth glazed; and then infuse the roses: strain the liquor when cold, and add the sugar.

Vinegar of Squills.

Take of dried squills one pound, of vinegar three quarts. Infuse the squills in the vinegar with a small heat, then press it out, and set it by, till the dregs are subsided; afterwards, to the depurated vinegar, add about a twelfth part of proof-spirit, that it may be preserved from contracting dregs by time.

Aloetic Alkaline-wine.

Take of any fixed alkaline salt, eight ounces, socotrine aloes, saffron, myrrh, of each one ounce, of purified sal ammoniac six drachms, of white wine a quart. Infuse them together without heat, for a week, or longer; then filtre the wine through paper.

Bitter Wine.

Take gentian root, the yellow part of fresh lemon-peel, of each one ounce, of long-pepper two drachms, of white wine a quart. Infuse without heat, and strain.

Antimonial Wine.

Take of the crocus of antimony washed, one ounce, of white wine a pint and an half. Infuse without heat, and then strain the wine off through paper.

Chalybeate Wine.

Take of filings of iron four ounces, cinnamon and mace, of each half an ounce, of Rhenish wine two quarts. Infuse a month without heat, often stirring, then strain it off.

Saffron Wine.

Take of saffron one ounce, of Canary one pint. Infuse without heat, and strain.

Wine with Ipecacoanha.

Take of the root ipecacoanha two ounces, of the yellow part of Seville orange-peel, dried, half an ounce, of Canary a quart. Infuse without heat, and strain.

Viper Wine.

Take of dried vipers two ounces, of white-wine three pints. Infuse with a gentle heat for a week, and then strain the wine off.

Tincture of Rhubarb in Wine.

Take of rhubarb two ounces, of the lesser cardamom seeds, husked, half an ounce, of saffron two drachms, of white-wine a quart. Infuse three days without heat, and strain.

Tinctura Sacra.

Take of socotrine aloes eight ounces, of Winter's bark two ounces, of white-wine five quarts. Pulverize the

the aloes and bark ſeparately, then mix them, and pour on the wine; infuſe for a week or longer without heat, the glaſs being often ſhook, and laſtly, ſtrain the wine off.

It is convenient to mix ſome clean white ſand with the powders, that the aloes, when they become moiſt, may not cling into a lump.

Thebaic Tincture.

Take of opium ſtrained two ounces, cinnamon and cloves, of each a drachm, of white-wine a pint. Infuſe without heat for a week, and then ſtrain off the wine through paper.

Bitter Tincture.

Take of gentian-root two ounces, of the outer yellow rind of Seville orange-peel, dried, one ounce, of the leſſer cardamom ſeeds, huſked, half an ounce, of proof-ſpirit a quart. Digeſt without heat, and then ſtrain.

Tincture of Antimony.

Take of any fixed alkaline ſalt a pound, of antimony half a pound, of rectified ſpirit of wine a quart. Mix the antimony reduced to powder with the ſalt, and melt them together for an hour in a ſtrong fire, then pour all out, and being pulveriſed, pour on the ſpirit of wine. Digeſt for three or four days, and afterwards ſtrain off.

Aromatic Tincture.

Take of cinnamon ſix drachms, of the leſſer cardamom ſeeds, huſked, three drachms, long pepper, ginger, of each two drachms, of proof ſpirit a quart. Digeſt without heat, and ſtrain the ſpirit off.

Tincture of Cantharides.

Take of cantharides, bruiſed, two drachms, of cochineal half a drachm, of proof-ſpirit a pint and an half. After digeſtion filtre the ſpirit through paper.

Tincture of Cardamom Seeds.

Take of the leſſer cardamom ſeeds, freed from their huſks, half a pound, of proof-ſpirit a quart. Digeſt without heat, and ſtrain off the ſpirit.

Tincture of Caſtor.

Take of Ruſſia caſtor, powdered, two ounces, of proof-ſpirit a quart. Digeſt for ten days without heat, and then ſtrain the ſpirit off.

Tincture of Cinnamon.

Take of cinnamon an ounce and an half, of proof-ſpirit a pint. Digeſt without heat, and ſtrain the ſpirit off.

Simple Tincture of the Peruvian Bark.

Take of the Peruvian bark four ounces, of proof-ſpirit a quart. After digeſtion ſtrain the ſpirit off.

Volatile Tincture of the Peruvian Bark.

Take of the Peruvian bark four ounces, of ſpirit of ſal-armoniac a quart. Digeſt without heat in a cloſe veſſel, and then ſtrain the ſpirit off.

Fœtid Tincture.

Take of aſſafœtida four ounces, of rectified ſpirit of wine a quart. After digeſtion ſtrain the ſpirit off.

Tincture of Soot.

Take of wood-ſoot two ounces, of aſſafœtida one ounce, of proof-ſpirit a quart. After digeſtion ſtrain the ſpirit off.

Volatile Tincture of Gum-guaiacum.

Take of gum-guaiacum four ounces, of the aromatic volatile ſpirit a pint and a half. Digeſt without heat in a well-cloſed veſſel, and then ſtrain the ſpirit off.

Tincture of Jalap.

Take of the root of jalap eight ounces, of proof-ſpirit a quart. After digeſtion ſtrain off the ſpirit.

Tincture

Tincture of Japan Earth.

Take of Japan earth three ounces, of cinnamon two ounces, of proof-ſpirit a quart. After digeſtion ſtrain the ſpirit off.

Tincture of Martial Flowers.

Take of martial flowers four ounces, of proof-ſpirit a pint. After digeſtion ſtrain the ſpirit off.

Tincture of Iron in Spirit of Salt.

Take of the filings of iron half a pound, of Glauber's ſpirit of ſea-ſalt three pounds, of rectified ſpirit of wine three pints. Digeſt the filings in the ſpirit of ſalt without heat, as long as the ſpirit will work on them; then, after the fæces have ſubſided, evaporate the liquor poured off clear to one pound; and to this add the ſpirit of wine.

Tincture of Black Helebore.

Take of the root of black helebore four ounces, of cochineal two ſcruples, of proof-ſpirit a quart. After digeſtion filtre through paper.

Tincture of Myrrh.

Take of myrrh three ounces, of proof-ſpirit a quart. Digeſt them together, and then ſtrain the ſpirit off.

Tincture of Rhubarb in Spirit.

Take of rhubarb two ounces, of the leſſer cardamom ſeeds, freed from their huſks, half an ounce, of ſaffron two drachms, of proof-ſpirit a quart. Digeſt without heat, and ſtrain the ſpirit off.

Saturnine Tincture.

Take ſugar of lead, green vitriol, of each two ounces, of rectified ſpirit of wine a quart. Reduce the ſalts ſeparately to powder, and put them into the ſpirit; then digeſt without heat, and filtre the ſpirit through paper.

Tincture of Sena.

Take of ſtoned raiſins ſixteen ounces, of the leaves of ſena a pound, of carraway-ſeeds an ounce and an half, of cardamom-ſeeds, huſked, half an ounce, of proof-ſpirit a gallon. Digeſt without heat, and ſtrain off the ſpirit.

Tincture of Snake-Root.

Take of Virginia ſnake-root three ounces, of proof-ſpirit a quart. Digeſt without heat, and ſtrain off the ſpirit.

Stomachic Tincture.

Take of ſtoned raiſins four ounces, of cinnamon half an ounce, carraway-ſeeds, the leſſer cardamom-ſeeds, freed from their huſks, and cochineal, of each two drachms, of proof-ſpirit a quart. Digeſt without heat, and ſtrain off the ſpirit.

Stiptic Tincture.

Take of calcined green vitriol one drachm, of French brandy tinctured by the caſk a quart. Mix them, that the ſpirit may turn black, and then ſtrain it off.

Simple Tincture of Valerian.

Take of wild valerian root four ounces, of proof-ſpirit a quart. After digeſtion ſtrain off the ſpirit.

Volatile Tincture of Valerian.

Take of the root of wild valerian four ounces, of the volatile aromatic ſpirit a quart. Digeſt them together in a cloſe veſſel without heat, and then ſtrain the tincture off.

Tincture of White Helebore.

Take of the root of white helebore eight ounces, of proof-ſpirit a quart. After digeſtion filtre through paper.

Balſam of Guaiacum.

Take of gum-guaiacum a pound, of balſam of Peru three drachms, of rectified ſpirit of wine two pints and an half. Digeſt them together, that the gum may be diſſolved, and then ſtrain off the ſpirit.

Vulnerary Balſam.

Take of Benjamin three ounces, of ſtrained ſtorax two ounces, of balſam of Tolu one ounce, of ſocotrine aloes half an ounce, of rectified ſpirit of wine a quart. Digeſt them together till as much as may be of the gums are diſſolved, then ſtrain the tincture off.

Elixir of Aloes.

Take of the tincture of myrrh a quart, ſaffron, ſocotrine aloes, of each three ounces in weight. After digeſtion ſtrain off the ſpirit.

Paregoric Elixir.

Take flowers of Benjamin, and opium, ſtrained, of each a drachm, of camphor two ſcruples, of the eſſential oil of anniſeeds half a drachm, of rectified ſpirits of wine a quart. After digeſtion ſtrain off the ſpirit.

Acid Elixir of Vitriol.

Take of the aromatic tincture a pint, of the ſtrong ſpirit or oil of vitriol, the weight of four ounces. Mix them gradually, and when the fæces are ſubſided, filtre through paper.

Dulcified Elixir of Vitriol.

Take of the aromatic tincture a pint, of dulcified ſpirit of vitriol eight ounces in weight. Mix them.

Compound Elixir of Myrrh.

Take of the extract of ſavine one ounce, of the tincture of caſtor a pint, of the tincture of myrrh half a pint. After digeſtion ſtrain off the tincture.

Camphorated Julep.

Take of camphor one drachm, of double-refined ſugar half an ounce, of boiling water a pint. Firſt grind the camphor with a little rectified ſpirit of wine, till it is ſoftened, then with the ſugar till they are perfectly united; laſtly, add the water by degrees, and when the mixture has ſtood in a covered veſſel till it is cold, ſtrain it off.

Chalk Julep.

Take of the whiteſt chalk, prepared, one ounce, of double-refined ſugar ſix drachms, of gum-arabic two drachms, of water a quart. Mix all together.

Muſk Julep.

Take of damaſk roſe-water the meaſure of ſix ounces, of muſk twelve grains, of double-refined ſugar one drachm. Grind the muſk and ſugar together, and gradually add the roſe-water.

Common Emulſion.

Take of ſweet almonds blanched, one ounce, of gum-arabic half an ounce, of double-refined ſugar ſix drachms, of barley-water a quart. Diſſolve the gum in the barley-water hot, and when the water is quite cold, pour it gradually upon the almonds, pounded with the ſugar, rubbing them together that the liquor may grow milky, then ſtrain it off.

Milk of Gum-Ammoniac.

Take of gum-ammoniac two drachms, of ſimple penny-royal water half a pint. Rub the gum in a mortar with the water, till it is diſſolved.

Camphorated Spirit of Wine.

Take of camphor two ounces, of rectified ſpirit of wine a quart. Mix them, that the camphor may be diſſolved.

Syrups.

Wherever the weight of the ſugar is not ſpecified, it is to be underſtood that to each pint of liquor are to be allowed twenty-nine ounces of ſugar. The ſugar ſhould be double-refined, reduced to powder, and melted in the heat of a balneum, unleſs it be ordered otherwiſe; and the ſyrup, as ſoon as made, is to be ſet by till the next day, when any ſaccharine cruſt that may ſwim on the top, is to be taken off.

Syrup

Syrup of Garlic.

Take of the roots of garlic ſliced one pound, of boiling water a quart. Steep the garlic in the water twelve hours in a cloſe veſſel, and in the liquor ſtrained diſſolve a ſufficient quantity of ſugar, ſo as to make the ſyrup.

Syrup of Marſhmallows.

Take of the freſh roots of marſhmallows a pound, of double-refined ſugar four pounds, of water one gallon. Boil the water with the roots till it is half waſted; after it is quite cold, pour it off, and preſs it out; let the liquor ſtand by for a night, that its fæces may ſubſide; in the morning pour off the clear, and adding the ſugar, boil all down to the weight of ſix pounds.

Spirit of Orange-peel.

Take of the outer yellow rind of freſh Seville orange-peel eight ounces, of boiling water five pints. Steep the peel in the water for a night, in a cloſe veſſel, and in the morning diſſolve in the liquor ſtrained, of double refined ſugar beaten to powder, as much as is ſufficient to make a ſyrup.

Syrup of Balſam.

Take of balſam of Tolu eight ounces, of water three pints. Boil the balſam in the water in a circulatory veſſel, or at leaſt in a matras with a tall neck, and the orifice lightly covered, for two or three hours. When the water is cold and ſtrained off, add double-refined ſugar to make it into a ſyrup.

Syrup of Clove Gilliflowers.

Take of the clove gilliflowers, freſh, and their heels cut off, three pounds, of boiling water five pints. Steep the flowers in the water for a night in a veſſel of glaſs, or of earth glazed, and in the liquor ſtrained diſſolve as much double-refined ſugar as is required to make a ſyrup.

After the ſame manner is prepared the ſyrup of cowſlips.

Syrup of Saffron.

Take of the ſyrup of ſaffron-wine a pint, of double-refined ſugar twenty-five ounces, which diſſolve in the wine, ſo as to make a ſyrup.

Syrup of Quinces.

Take of the depurated juice of quinces three pints, of cinnamon one drachm, cloves and ginger, of each half a drachm, of red-wine one pint, of double-refined ſugar nine pounds. Digeſt the juice with the aromatics ſix hours in a heat of aſhes, then add the wine, and ſtrain the liquor off; and laſtly, add the ſugar to make the ſyrup.

Syrup of Lemon-Juice.

Take of lemon-juice, after it has ſtood till its fæces are ſubſided, and it has been ſtrained off, a quart, of double-refined ſugar ſifty ounces. Diſſolve the ſugar in the juice ſo as to make the ſyrup.

After the ſame manner are made the ſyrups of mulberries and raſberries.

Syrup of white Poppy-heads.

Take of the heads of dried white poppies without their ſeeds, three pounds and an half, of water ſix gallons. Slice the heads, and boil them in the water, often ſtirring them that they may not burn, till about a third only of the liquor is left, which will be almoſt all imbibed by the poppy-heads, then take all from the fire, and preſs the liquor ſtrongly out from the heads: in the next place boil the liquor by itſelf to about two quarts, and then ſtrain it, while hot, firſt through a ſieve, and then through a thin flannel; ſet it by for a night, that what fæces have paſſed the ſtrainers may ſubſide,

next morning pour off the clear liquor, and boil it with ſix pounds of double-refined ſugar, till the whole comes to the weight of nine pounds, or a little more, that it may become a ſyrup of a juſt conſiſtence.

Syrup of wild Poppies.

Take of the freſh flowers of wild poppies four pounds, of boiling water four pints and an half. Set the water poured on the flowers over the fire, and ſtir the flowers in till they are all thoroughly wet; and as ſoon as ever the flowers are ſunk, let them ſteep for a night; next day pour off, and preſs out the liquor, ſetting it by for another night, that its fæces may ſubſide, then, with a proper addition of double-refined ſugar, make the ſyrup.

Pectoral Syrup.

Take of the leaves of Engliſh maidenhair dried five ounces, of liquorice four ounces, of boiling water five pints. Steep the ingredients for ſome hours, and when the liquor is ſtrained off, diſſolve it in a proper quantity of double-refined ſugar to make a ſyrup.

Solutive Syrup of Roſes.

Take the decoction left after the diſtillation of ſix pounds of damaſk roſes, and five pounds of double-refined ſugar. Boil down the decoction preſſed out to three pints, and ſet it by for a night, that its fæces may ſubſide; next morning pour off the clear liquor, and adding the ſugar, make it into a ſyrup, by boiling it away to the weight of ſeven pounds and an half.

Syrup of Squills.

Take of vinegar of ſquills a pint and an half, cinnamon and ginger, of each an ounce, of double-refined ſugar three pounds and an half. Steep the ſpices for three days in the vinegar, and when ſtrained, make the ſyrup by adding the ſugar.

Simple Syrup.

Diſſolve in any quantity of water, the proper weight of double-refined ſugar to make a ſyrup.

Syrup of Buckthorn.

Take of the juice of buckthorn-berries, ripe and freſh, one gallon; cinnamon, ginger, and nutmeg, of each one ounce, of double-refined ſugar ſeven pounds. Set the juice by a few days, that its fæces may ſeparate, then ſtrain it, and in a ſmall quantity of it infuſe the ſpices. Boil down the reſt, towards the end adding that wherein the ſpices have been infuſed, but ſtrained from them, that the whole may be reduced to two quarts, then add the ſugar, and make the ſyrup.

Syrup of Violets.

Take of violets, freſh and well coloured, two pounds, of boiling water five pints. Steep the flowers a whole day in a glaſs, or earthen veſſel glazed, then pour off the liquor, and ſtrain it through a fine linen cloth, with caution not to preſs at all the flowers; afterwards, with a proper quantity of double-refined ſugar, make it into a ſyrup.

Syrup of Ginger.

Take of ginger ſliced thin four ounces, of boiling water three pints. Let the ginger ſteep ſome hours, and add the proper quantity of double-refined ſugar to make a ſyrup.

Confection of Kermes.

Take of the juice of kermes, warmed and ſtrained, three pounds, of damaſk roſe-water ſix ounces in meaſure, of oil of cinnamon half a ſcruple, of double-refined ſugar one pound. Melt the ſugar by the heat of a balneum into a ſyrup with the roſe-water; then add the kermes juice, and, after it is cold, the oil of cinnamon.

Egyptiac

Egyptian Honey.

Take of verdigris powdered very fine five ounces, of honey the weight of fourteen ounces, of vinegar the meafure of feven ounces. Boil all together over a gentle fire, till the mixture acquires a proper confiftence and reddifh colour; after a time, a groffer part will fubfide from this mixture; the upper and more liquid part of which is called the Egyptian honey.

Honey of Fluellin.

Take of the depurated juice of female fluellin four pints, of clarified honey four pounds. Boil them together to a proper confiftence.

Honey of Helebore.

Take of the roots of white helebore dried and fliced one pound, of clarified honey three pounds, of water four pints. After fteeping the roots three days in the water, boil them a little while; then boil the liquor well preffed out and ftrained, with the honey, to a due confiftence.

Honey of Rofes.

Take of red rofe-buds quick dried, and their heels cut off, four ounces, of boiling water three pints, of clarified honey five pounds. Steep the rofes fome hours in water, then to the ftrained liquor add the honey, and boil to a proper confiftence.

Solutive Honey.

Take the decoction remaining after the diftillation of fix pounds of damafk rofes, take alfo of cummin-feed a little bruifed an ounce, of coarfe fugar four pounds, of honey two pounds. Boil the decoction preffed out to three pints, adding towards the end the feeds tied up in a cloth, then gently boil it with the fugar and honey into the confiftence of a liquid honey.

Oxymel with Garlic.

Take of garlic fliced an ounce and a half, carraway-feeds, fweet fennel-feeds, of each two drachms, of clarified honey ten ounces, of vinegar half a pint. Boil the vinegar a little while in a glazed earthen veffel with the feeds bruifed, then add the garlic, and cover the veffel; after all is cold prefs out the liquor, and with the heat of a balneum diffolve it in the honey.

Oxymel of Squills.

Take of clarified honey three pounds, of vinegar of fquills a quart. Boil them together in a glazed earthen veffel, with a gentle fire, to the confiftence of a fyrup.

Simple Oxymel.

Take of clarified honey two pounds, of vinegar a pint. Boil them in a glazed earthen veffel, with a gentle fire, to the confiftence of a fyrup.

Powder againft the Bite of a Mad Dog.

Take of afh-coloured ground liverwort two ounces, of black pepper one ounce. Beat them together into a powder.

Compound Powder of Cuckow-Pint.

Take of the root of cuckow-pint frefh dried two ounces, the root of the yellow water-flag, the root of burnet faxifrage, of each one ounce; prepared crabs-eyes, cinnamon, of each half an ounce; of falt of wormwood two drachms. Let all be beat into a powder, which muft be kept in a very clofe veffel.

Compound Powder of Bole without Opium.

Take of bole armenac, or of French bole, half a pound, of cinnamon four ounces, tormentil root, gum-arabic, of each three ounces, of long pepper half an ounce. Make them into a powder.

Compound Powder of Bole, with Opium.

Take of opium ftrained, three drachms. Then let it be a little dried,

dried, that it may be commodiouſly reduced to powder, and add it to the ſpecies of the preceding compoſition, before they are pulveriſed, that they may be all beat together into a powder.

Compound Powder of Ceruſs.

Take of ceruſs five ounces, of ſarcocol an ounce and an half, of gum dragant half an ounce. Make all into a powder.

Compound Powder of Crabs-Claws.

Take of the tips of crabs-claws prepared one pound, prepared pearls, red coral prepared, of each three ounces. Mix all together.

Bezoardic Powder.

Take of the compound powder of crabs-claws a pound, of oriental bezoar prepared, an ounce. Make them together into a powder.

Compound Powder of Contrayerva.

Take of the compound powder of crabs-claws a pound and an half, of contrayerva root five ounces. Make them into a powder.

Compound Powder of Myrrh.

Take of dried leaves of rue, dittany of Crete, myrrh, of each an ounce and an half, aſſafœtida, ſagapenum, Ruſſia caſtor, opopanax, of each an ounce. Beat all together into a powder.

Compound Powder of Scammony.

Take of ſcammony four ounces, of burnt hartshorn, prepared, three ounces. Grind them carefully together into a powder.

Compound Powder of Sena.

Take leaves of ſena, cryſtals of tartar, of each two ounces, of ſcammony half an ounce, cloves, cinnamon, ginger, of each two drachms. Powder the ſcammony by itſelf, the reſt all together, and then mix them.

Sneezing Powder.

Take the dried leaves of aſarabacca, of marjoram, of Syrian maſtich, thyme, dried lavender flowers, of each equal weights; and rub all into a powder.

Compound Powder of Amber.

Take prepared amber, gum-arabic, of each ten drachms, juice of the rape of Ciſtus, baluſtines, japan earth, of each five drachms, of olibanum half an ounce, of ſtrained opium a drachm. Reduce all into a powder.

Compound Powder of Gum-Dragant.

Take of gum-dragant, gum-arabic, marſhmallow root, of each an ounce and an half, ſtarch, liquorice, of each half an ounce, of double-refined ſugar three ounces. Reduce all together into a powder.

Hiera-Picra.

Take of the gum extracted from ſocotrine aloes one pound, of Winter's bark three ounces, powder them ſeparately, and then mix them.

Aromatic Species.

Take of cinnamon two ounces, the leſſer cardamom-ſeeds freed from their huſks, ginger, long pepper, of each one ounce. Make all into a powder by beating them together.

Species of Scordium without Opium.

Take of bole-armenic, or of French bole, four ounces, of ſcordium or water germander, two ounces, of cinnamon an ounce and an half, ſtorax ſtrained, roots of tormentil, biſtort, gentian, leaves of dittany of Crete, galbanum ſtrained, gum arabic, and red roſes, of each one ounce, long pepper, and ginger, of each an ounce. Beat all into a powder.

Species of Scordium with Opium.

Take of ſtrained opium three drachms, and add it to the former ſpecies,

ſpecies, while they are pounding together, it being firſt a little dried, that it may the more commodiouſly be beaten to powder.

Sugar of Roſes.

Take of red roſe-buds, quick dried, and their white heels cut off, one ounce, of double-refined ſugar a pound. Reduce the roſes and ſugar to powder ſeparately, then mix them, and with a little water form lozenges to be dried with a gentle heat.

White Pectoral Troches.

Take of double-refined ſugar a pound and an half, of ſtarch an ounce and a half, of liquorice ſix drachms, of Florentine orris half an ounce. All the ingredients being reduced to powder, with the mucilage of gum-tragacanth form troches.

Black Pectoral Troches.

Take extract of liquorice, and double-refined ſugar, of each ten ounces, of gum-dragant half a pound. By moiſtening with water make troches.

Troches of Nitre.

Take of purified nitre four ounces, of double-refined ſugar a pound. Make them into troches with the mucilage of gum-tragacanth.

Troches of Squills.

Take of baked ſquills half a pound, of wheat-flower four ounces. Pound them together, and form them into troches to be dried with a ſmall heat.

Troches of Sulphur.

Take of waſhed flowers of ſulphur two ounces, of double-refined ſugar four ounces. Beat them together, and form troches, by gradually adding the mucilage of quince-ſeeds.

Troches of Japan Earth.

Take Japan earth, and gum-arabic, of each two ounces, of ſugar of roſes ſixteen ounces. Beat them together, and with a little water make into troches.

Cardialgic Lozenges.

Take of prepared chalk four ounces, of prepared crabs-claws two ounces, of bole-armenic, or French bole, half an ounce, of nutmeg a ſcruple, of double-refined ſugar three ounces. Make all into a powder, and then with a little water form it into lozenges.

Aromatic Pills.

Take of ſocotrine aloes an ounce and an half, of gum-guaiacum an ounce, the aromatic ſpecies, and balſam of Peru, of each half an ounce. Let the aloes and gum-guaiacum be powdered ſeparately, then mixed with the reſt, and formed into a maſs with the ſyrup of orange-peel.

The more ſimple Pills of Coloquintida.

Take the pith of coloquintida and ſcammony, of each two ounces, of oil of cloves two drachms. Let the dry ſpecies be reduced to powder ſeparately, the oil be mixed with them, and the whole be formed into a maſs with ſyrup of buckthorn.

Pills of Coloquintida with Aloes.

Take ſocotrine aloes and ſcammony, of each two ounces, of the pith of coloquintida one ounce, of oil of cloves two drachms. Let the dry ſpecies be reduced to powder ſeparately, the oil mixed among them, and the whole formed into a maſs with ſyrup of buckthorn.

Deobſtruent Pills.

Take of the aromatic pill three ounces, rhubarb, extract of gentian, and ſalt of iron, of each one ounce, of ſalt of wormwood half an ounce. With ſolutive ſyrup of roſes beat them diligently into a maſs.

Gum Pills.

Take galbanum, opopanax, myrrh, and ſagapenum, of each an ounce, of

of assafœtida half an ounce. With syrup of saffron make them into a mass.

Mercurial Pills.

Take quicksilver five drachms, Strasbourg turpentine two drachms, the cathartic extract four scruples, rhubarb in powder one drachm. First grind the quicksilver with the turpentine, till it appears no longer, then beat them up with the rest into a mass. If the turpentine chance to be too thick, it is to be thinned with a little oil of olives.

Rufus's Pills.

Take of socotrine aloes two ounces, myrrh and saffron, of each one ounce. Make them into a mass with syrup of saffron.

Soap Pills.

Take almond soap four ounces, strained opium half an ounce, essence of lemons a drachm. Beat the opium, softened with a little wine, along with the rest of the ingredients, till they are perfectly mixed.

Storax Pills.

Take strained storax two ounces, saffron one ounce, strained opium five drachms. Beat them diligently together till they are perfectly mixed.

Electuary of Bay-Berries.

Take the leaves of rue dried, carraway-seeds, and bay-berries, of each an ounce, sagapenum half an ounce, black pepper and Russia castor, of each two drachms, clarified honey thrice the weight of the species when powdered. Mix the species with the honey into an electuary.

Electuary of Cassia.

Take solutive syrup of roses, and pulp of cassia fresh extracted, of each half a pound, of manna two ounces, of the pulp of tamarinds one ounce. Rub the manna in a mortar, and with a very gentle heat dissolve it in the syrup, then add the pulps, and the heat being continued, reduce the whole to a proper consistence.

Lenitive Electuary.

Take dried figs one pound, of the leaves of sena eight ounces, the pulps of tamarinds, cassia, and French prunes, of each half a pound, coriander-seeds four ounces, liquorice three ounces, double-refined sugar two pounds and an half. Reduce the sena with the coriander-seeds to powder, and separate by the sieve ten ounces; boil the rest with the figs and liquorice, in two quarts of water, till it is boiled half away, then strain and press it out; let the strained liquor be evaporated to the weight of a pound and an half, or a little less; afterwards add the sugar to make a syrup; this syrup mix gradually with the pulps; and lastly, stir in the powder before separated by the sieve.

Electuary of Scammony.

Take of scammony an ounce and an half, cloves and ginger, of each six drachms, of the essential oil of carraway-seeds, half a drachm, honey half a pound. Reduce the scammony to powder by itself, mix the aromatics first pounded together, with the honey, then add the scammony, and in the last place the oil.

Electuary of Scordium.

Take of any quantity of the species of scordium, or water-germander, with opium, and thrice their weight of diacodium, boiled to the thickness of honey. Mix the species with the syrup into an electuary.

Locatellus's Balsam.

Take oil olive a pint, Strasbourg turpentine and yellow wax, of each half a pound, red sanders six drachms. Melt the wax with some part of the oil over a gentle fire, then add the rest of

of the oil and the turpentine; in the last place mix in the sanders, and stir the whole well together, till it is nearly cold.

The Cordial Confection.

Take fresh rosemary tops, and juniper berries, of each a pound, the lesser cardamom-seeds freed from their husks, zedoary, and saffron, of each half a pound. Draw a tincture with about a gallon and an half of proof-spirit; reduce by a gentle heat this tincture strained, nearly to the weight of two pounds and an half, then finish the electuary, by adding the following species very finely powdered, viz. of the compound powder of crabs-claws sixteen ounces, cinnamon and nutmegs, of each two ounces, cloves an ounce, double-refined sugar two pounds.

The Confection called Paulina.

Take costus, or in its stead zedoary, cinnamon, long pepper, strained storax, strained galbanum, strained opium, and Russia castor, of each two ounces, of the simple syrup boiled to the consistence of honey, an equal weight to thrice the species. Mix carefully the opium, first dissolved in wine, with the syrup warmed; then to the storax and galbanum, melted together, add by degrees the syrup, while it remains warm, afterwards sprinkle in the other species reduced to powder.

Mithridate.

Take cinnamon fourteen drachms, myrrh eleven drachms, agaric, spikenard, ginger, saffron, seeds of treacle mustard, or of mithridate mustard, frankincense, and Chio turpentine, of each ten drachms, camels-hay, costus, or in its stead, zedoary, Indian leaf, or in its stead mace, French lavender, long pepper, seeds of hartwort, juice of the rape of cistus, strained storax, opopanax, strained galbanum, balsam of Gilead, or in its stead expressed oil of nutmegs, and Russia castor, each an ounce; poley mountain, water-germander, the fruit of the balsam-tree, or in its stead cubebs, white pepper, seeds of the carrot of Crete, and bdellium strained, each seven drachms, Celtic nard, gentian root, leaves of dittany of Crete, red roses, seeds of Macedonian parsley, the lesser cardamom-seeds freed from their husks, sweet fennel seeds, gum-arabic, and opium strained, each five drachms; root of the sweet flag, root of wild valerian, anniseed, and sagapenum strained, each three drachms; spignel, St. John's wort, juice of acacia, or in its stead Japan earth, the bellies of scinks, each two drachms and an half; clarified honey thrice the weight of all the rest. Dissolve the opium first in a little wine, and then mix it with the honey made hot; in the mean time melt together in another vessel, the galbanum, storax, turpentine, and the balsam of Gilead, or the expressed oil of nutmeg, continually stirring them round, that they may not burn; and as soon as these are melted, add to them the hot honey, first by spoonfuls, and afterwards more freely: lastly, when this mixture is nearly cold, add by degrees the rest of the species reduced to powder.

London Philonium.

Take white pepper, ginger, carraway-seeds, each two ounces, opium strained six drachms, diacodium boiled to the consistence of honey, thrice the weight of all the rest. Mix carefully the opium, dissolved first in wine, with the syrup warmed, and then add the other species reduced to powder.

Venice Treacle.

Take of the troches of squills half a pound, long pepper, opium strained, and dried vipers, each three ounces; cinnamon, balsam of Gilead, or in its stead expressed oil of nutmeg, each two ounces; agaric, the root of Florentine orris, water-germander, red-roses, seeds of navew, and extract

tract of liquorice, each an ounce and an half; ſpikenard, ſaffron, amomum, myrrh, coſtus, or in its ſtead zedoary and camels-hay, each an ounce; the root of cinquefoil, rhubarb, ginger, Indian leaf, or in its ſtead mace, leaves of dittany of Crete, horehound, and calamint, French lavender, black pepper, ſeeds of Macedonian parſley, olibanum, Chio turpentine, root of wild valerian, each ſix drachms; gentian root, Celtic nard, ſpignal, leaves of poley mountain, St. John's wort, ground-pine, tops of creeping germander, with the ſeed, the fruit of the balſam tree, or in its ſtead cubebs, anniſeeds, ſweet fennel-ſeeds, the leſſer cardamom ſeeds, freed from their huſks, ſeed of biſhop's weed, hartwort, treacle muſtard, or mithridate muſtard, juice of the rape of ciſtus, acacia, or in its ſtead Japan earth, gum-arabic, ſtorax ſtrained, ſagapenum ſtrained, Lemnian earth, or in its ſtead bole-armenic, or French bole, and green vitriol calcined, each half an ounce; roots of creeping birthwort, or in its ſtead of the long birthwort, tops of the leſſer centaury, ſeeds of the carrot of Crete, opopanax, galbanum ſtrained, Ruſſia caſtor, Jew's pitch, or in its ſtead white amber prepared, and root of the ſweet flag, each two drachms; clarified honey thrice the weight of all the reſt. The ingredients are to be mixed in the ſame manner as in the mithridate.

Bate's Alum Water.

Take alum, and white vitriol, each half an ounce, water a quart. Diſſolve the ſalts by boiling them in the water, and when the fæces have ſubſided, filtre the liquor through paper.

Sapphire-coloured Water.

Take lime-water a pint, ſal ammoniac one drachm. Let them ſtand together in a copper-veſſel, or with a few bits of copper, till the water has acquired a blue ſapphire colour.

Blue Vitriolic Water.

Take blue vitriol three ounces, alum, and the ſtrong ſpirit or oil of vitriol, each two ounces; water a pint and an half. Boil the ſalts in the water till they are diſſolved, then add the oil of vitriol, and ſtrain the mixture through paper.

Camphorated Vitriolic Water.

Take white vitriol half an ounce, camphor two drachms, boiling water a quart. Mix them, that the vitriol may be diſſolved, and after the fæces have ſubſided, filtre the water through paper.

Saponaceous Lotion.

Take damaſk roſe-water three quarters of a pint, oil olive a quarter of a pint, the ley of tartar, the meaſure of half an ounce. Rub the ley of tartar and oil together, till they are mixed, then gradually add the water.

Oil of St. John's Wort.

Take of the flowers of St. John's wort full blown, freſh, and carefully picked from their calyxes, four ounces, oil olive a quart. The oil being poured on the flowers, let them ſtand together till the oil is ſufficiently tinged.

Oil of Mucilages.

Take of the roots of marſhmallows freſh, half a pound, linſeed and fenugreek ſeeds, of each three ounces, water a quart, oil olive two quarts. Boil gently the roots and ſeeds bruiſed in the water for half an hour, afterwards add the oil, and renew the boiling, till the water is quite waſted, then pour the oil cautiouſly off.

Oil of Elder.

Take of elder flowers one pound, oil olive a quart. Boil the flowers in the oil, till they are almoſt criſp, then preſs out the oil, and ſet it by, that the fæces may ſubſide.

Green

Green Oil.

Take bay-leaves, leaves of rue, marjoram, ſea-wormwood, and camomile, each three ounces, oil olive a quart. The herbs being bruiſed, boil them lightly in the oil, till they are become criſp, then preſs out the oil, and after the fæces have ſubſided pour it off.

Ammoniac Plaſter, with Quickſilver.

Take of gum-ammoniac ſtrained, a pound, quickſilver three ounces, the ſimple balſam of ſulphur a drachm. Rub the quickſilver with the balſam of ſulphur, till it no longer appears, then add, by degrees, the gum-ammoniac melted, a little before it is cold, and mix them carefully.

Drawing Plaſter.

Take yellow roſin, and yellow wax, each three pounds, tried mutton ſuet one pound. Melt all together, and ſtrain the mixture while it remains fluid.

Cephalic Plaſter.

Take Burgundy pitch two pounds, ſoft labdanum one pound, yellow roſin, and yellow wax, each four ounces, the expreſſed oil of mace one ounce. The pitch, roſin, and wax, being melted together, add firſt the labdanum, and then the oil of mace.

Common Plaſter.

Take oil olive one gallon, litharge finely powdered five pounds. Boil them together with about a quart of water, over a gentle fire, continually ſtirring, till the oil and litharge are united, and they acquire the due conſiſtence of a plaſter; and if the water is waſted before the operation is over, more water muſt be poured on hot.

Common ſticking Plaſter.

Take of the common plaſter three pounds, of yellow roſin half a pound. Throw the roſin firſt reduced to powder, that it may the ſooner melt, into the common plaſter melted with a very gentle heat, and ſtir them well together.

Common Plaſter, with Gums.

Take of the common plaſter three pounds, of galbanum ſtrained, eight ounces, of common turpentine and frankincenſe, each three ounces. To the galbanum and turpentine melted together with a gentle heat, ſprinkle in the frankincenſe reduced to powder, and then gradually add to them the plaſter, firſt melted likewiſe with a very gentle heat.

Common Plaſter, with Quickſilver.

Take of the common plaſter one pound, quickſilver three ounces, the ſimple balſam of ſulphur a drachm. Mix them together after the ſame manner as in the ammoniac plaſter with quickſilver.

Cummin Plaſter.

Take Burgundy pitch three pounds, yellow wax, cummin-ſeeds, carraway-ſeeds, and bayberries, each three ounces. The pitch and wax being melted together, ſprinkle into them the reſt reduced to powder, and ſtir all well together.

Red Lead Plaſter.

Take oil olive two quarts, red lead finely powdered, two pounds and an half. This plaſter is to be prepared in the ſame manner as the common plaſter, only here more water is required, and more caution, that the plaſter may not be burnt and turn black.

Plaſter of Mucilages.

Take yellow wax forty ounces, the oil of mucilages eight ounces in meaſure, gum-ammoniac ſtrained, half a pound, of common turpentine two ounces. The gum ammoniac being melted with the turpentine, add to them

them gradually the wax melted with the oil in another veſſel.

Strengthening Plaſter.

Take of the common plaſter two pounds, frankincenſe half a pound, dragons-blood three ounces. To the common plaſter melted, add the reſt reduced to powder.

Soap Plaſter.

Take of the common plaſter three pounds, hard ſoap half a pound. To the common plaſter liquified, add the ſoap, then melt all to the conſiſtence of a plaſter, and take particular care that it does not grow too cold before it is formed into rolls.

Stomach Plaſter.

Take ſoft labdanum three ounces, frankincenſe one ounce, cinnamon, and expreſſed oil of mace, ſo called, each half an ounce, eſſential oil of mint one drachm. Add to the frankincenſe melted, firſt the labdanum a little heated, till it is become ſoft, and then the oil of mace; afterwards mix in the cinnamon with the oil of mint, and beat them together in a warm mortar into a maſs, which is to be kept in a veſſel well cloſed.

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I.

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W.

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A

TREATISE

ON THE

OPERATIONS OF SURGERY.

WITH A

DESCRIPTION AND REPRESENTATION

OF THE

INSTRUMENTS USED IN PERFORMING THEM.

TO WHICH IS PREFIXED, AN

INTRODUCTION,

ON THE

NATURE AND TREATMENT

OF

WOUNDS, ABSCESSES, AND ULCERS.

BY SAMUEL SHARPE,

FELLOW OF THE ROYAL SOCIETY, AND MEMBER OF THE ACADEMY OF SURGERY AT PARIS.

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MDCCLXXXVIII.

TO

WILLIAM CHESELDEN, Esq.

SURGEON TO CHELSEA HOSPITAL.

SIR,

AS I am chiefly indebted to the Advantage of an Education under You for whatever Knowledge I can pretend to in Surgery, I could not in the leaſt heſitate to whom I ſhould dedicate this Treatiſe; though, was it my Misfortune to be a Stranger to your Perſon, that Merit which has made the World ſo long eſteem You the Ornament of our Profeſſion, would alone have induced me to ſhew You this Mark of my Reſpect, which, I hope, will not be unacceptable from,

SIR,

Your moſt obedient

Humble Servant,

S. SHARPE.

PREFACE.

AS the methods of operating in Surgery have of late years been exceedingly improved in England, and as there is no treatise of character on that subject written in our language, I believe it is not necessary to apologize for this undertaking: it is true, we have a few translations from the writings of foreigners; but, besides that they are unacquainted with these improvements, their manner of describing an operation is so very minute, and in general so little pleasing, that, could nothing new be added, or nothing false exploded, the possibility of only doing it more concisely and agreeably, would be a reasonable inducement to the attempt.

In the description of diseases, I have only mentioned their distinguishing appearances, and have not once dared to guess at that particular disorder in the animal œconomy, which is the immediate cause of them: indeed, the uncertainty there is in conjectures of this intricate nature, and the little service that can accrue to surgery from such speculative enquiries, have entirely deterred me from all pretence to this sort of theory; and since the most ingenious men hitherto have not, by the help of hypothesis, done any considerable service to the practice of surgery, nay, for the most part, have misled young surgeons from the study of the symptoms and cure of diseases to an idle turn of reasoning, and a certain stile in conversation, which has very much discredited the art amongst men of sense, I hope I am right in my silence on that head.

It has been very much my endeavour to make this treatise short, and therefore I have given no histories of cases, but where the uncommonness of the doctrine made it proper to illustrate it with fact, and these I have recited in the most concise manner I was able: on this account too, I think I have not attempted to explode any practice which is already in disrepute, and if it appear otherwise to men of skill here in London, I beg they will refer to those books of surgery

 which

which are now the beſt eſteemed in Europe, and to which I have almoſt always had an eye in the criticiſms I have made on the generality of opinions.

It is uſual with moſt writers to deſcribe at length the ſeveral bandages proper to be employed after each operation; but as the manner of applying them can hardly be learned from a deſcription only, or if it could, there is ſo little to be ſaid on that ſubject, but what muſt be copied from others, that I have forboren to follow the example; though, to ſay the truth, the purpoſe of bandage being chiefly to maintain a due ſituation of a dreſſing, or to make a compreſs on different parts, ſurgeons always turn a roller with thoſe views, as their diſcretion and dexterity guide them, without any regard to the exact rules laid down in theſe deſcriptions, which are almoſt impoſſible to be retained in the memory without a continual practice of them, and therefore we ſee are not much attended to.

In the firſt edition of this treatiſe I aſſerted, that the hæmorrhage, which ſometimes enſues in the lateral operation, had been eſteemed an objection of ſo great weight, as to have occaſioned its being ſuppreſſed in the hoſpitals of France by a royal edict: I have ſince been informed I was miſtaken in that particular, and that it had only been forbidden in the *Charité*, by Monſieur Marechal, the king's firſt ſurgeon, who had the inſpection of the practice of ſurgery in that hoſpital: what were his motives for not ſuffering this method to be continued there, after having been performed a whole ſeaſon, I will not take upon me to determine.

INTRODUCTION.

CHAP. I.

OF WOUNDS.

TO conceive rightly of the nature and treatment of wounds, under the variety of diſorders that they are ſubject to, it will be proper, firſt, to learn what are the appearances in the progreſs of healing a large wound, when it is made with a ſharp inſtrument, and the conſtitution is pure.

In this circumſtance, the blood-veſſels, immediately upon their diviſion, bleed freely, and continue bleeding, till they are either ſtopped by art, or at length contracting and withdrawing themſelves into the wound, their extremities are ſhut up by the coagulated blood. The hæmorrhage being ſtopped, the next occurrence, in about twenty-four hours, is a thin ſerous diſcharge; and a day or two after, an increaſe of it, though ſomewhat thickened, and ſtinking. In this ſtate it continues two or three days without any great alteration; from which time the matter grows thicker and leſs offenſive; and, when the bottom of the wound fills up with little granulations of fleſh, it diminiſhes in its quantity, and continues doing ſo till the wound is quite ſkinned over.

The firſt ſtage of healing, or the diſcharge of matter, is by ſurgeons called *Digeſtion*; the ſecond, or the filling-up with fleſh, *Incarnation*; and the laſt, or ſkinning-over, *Cicatrization*. Theſe are the technical terms chiefly in uſe, and are fully ſufficient to deſcribe the ſtate of wounds, without the farther ſubdiviſions uſually found in books.

It is worth obſerving, that the loſs of any particular part of the body can only be repaired by the fluids of that diſtinct part. As, in a broken bone, the callus is generated from the ends of the fracture, ſo, in a wound, is the cicatrix from the circumference of the ſkin only. Hence ariſes the neceſſity of keeping the ſurface even, either by preſſure, or eating medicines, that the eminence of the fleſh may not reſiſt the fibres of the ſkin in their tendency to cover the wound. This eminence is compoſed of little points, or granulations, called *Fungus*, or proud fleſh, and is frequently eſteemed an evil, though, in truth, this ſpecies of it be the conſtant attendant on healing wounds; for, when they are ſmooth, and have no diſpoſition to ſhoot out above their lips, there is a ſlackneſs to heal, and a cure is very difficultly effected. Since then a fungus prevents healing only by its luxuriancy, and all wounds cicatrize from their circumference, there will be no occaſion

to

to deſtroy the whole fungus every time it riſes, but only the edges of it near the lips of the ſkin, which may be done by gentle eſcharotics, ſuch as lint dipped in a mild ſolution of vitriol, or for the moſt part only by dry lint, and a tight bandage, which will reduce it ſufficiently to a level, if applied before the fungus have acquired too much growth. In large wounds, the application of corroſive medicines to the whole ſurface, is of no uſe; becauſe the fungus will attain but to a certain height when left to itſelf, which it will be frequently riſing up to, though it be often waſted; and as all the advantage to be gathered from it, is only from the evenneſs of its margin, the purpoſe will be as fully anſwered by keeping that under only, and an infinite deal of pain avoided from the continual repetition of eſcharotics.

When I ſpeak of the neceſſity of a wound being repaired by the ſame fluids of which the part was before compoſed, I mean, upon the ſuppoſition, that the renewal be of the ſame ſubſtance with the part injured; as callus is of bone, and a cicatrix is of ſkin; for a vacuity is generally filled up with one ſpecies only of fleſh, though it poſſeſs the ſpace in which were included, before the wound was made, the diſtinct ſeparate ſubſtances of membrana adipoſa, membrana muſculorum, and the muſcle itſelf; and even if we ſcratch or perforate a bone, there are certain wounded veſſels in it that puſh out fleſh which becomes the covering of it; and after fractures of the ſkull, when the ſurface of the brain is hurt, and part of the membranes and bones removed, the whole cavity is filled up by nearly the ſame uniform ſubſtance, till it arrive even with the ſkin, which ſpreads over it to complete the cure.

On this account it is, that after the healing of wounds, where the ſurface of the bone has been bare, the cicatrix is always adherent to it, and no abſolute diſtinction of parts preſerved; though if a wound be made of any certain magnitude, the adherence, after healing, will not be ſo wide as the wound itſelf was, but only of the extent of the cicatrix, which is always much ſmaller than the inciſion; becauſe healing does not conſiſt only in the forming of new matter, but alſo in the elongation of the fibres of the circumjacent ſkin and fleſh towards the center of the wound; which will cover it in more or leſs time, and in greater or leſs quantity, in proportion to their laxneſs; for the ſear does not begin to form till they reſiſt any farther extenſion; hence ariſes the advantage, in amputations, of ſaving a great deal of ſkin.

From what has been ſaid of the progreſs of a wound made by a ſharp inſtrument, where there is no indiſpoſition of body, we ſee the cure is performed without any interruption but from the fungus; ſo that the buſineſs of ſurgery will conſiſt principally in a proper regard to that point, and in applications that will the leaſt interfere with the ordinary courſe of nature, which, in theſe caſes, will be ſuch as act the leaſt upon the ſurface of the wound; and agreeably to this we find, that dry lint only is generally the beſt remedy through the whole courſe of dreſſing; at firſt it ſtops the blood with leſs injury than any ſtyptic powders or waters, and afterwards, by abſorbing the matter which in the beginning of ſuppuration is thin and acrimonious, it becomes in effect a digeſtive: during incarnation it is the ſofteſt medium that can be applied between the roller and tender granulations, and at the ſame time is an eaſy compreſs upon the ſprouting fungus.

Over the dry lint may be applied a pledget of ſome ſoft ointment ſpread upon tow, which muſt be renewed every day, and preſerved in its ſituation by a gentle bandage; though in all large wounds, the firſt dreſſing after that of the accident or operation, ſhould not be applied in leſs than three days, when the matter being formed, the lint ſeparates more

eaſily

easily from the part; in the removal of which, no force should be used, but only so much be taken away as is loose, and comes off without pain.

Perhaps it may appear surprising, that I do not recommend either digestive or incarnative ointments, which have had such reputation formerly for their efficacy in all species of wounds; but as the intent of medicines is to reduce the wound to a natural state, or a propensity to heal, (which is what I have already supposed it to be in) the end of such applications is not wanted; and in other respects dry lint is more advantageous, as may be learned from what I have said of its benefits. There are certainly many cases in which different applications will have their several uses; but these are when wounds are attended with a variety of circumstances not supposed in that I have been speaking of; though even when these, by the virtue of medicines, are reduced to as kind a state, the method of treating them afterwards should be the same, as will be better understood by the next chapter, in which I shall treat more particularly by the dressing of wounds.

CHAP. II.

OF INFLAMMATIONS AND ABSCESSES.

As almost all abscesses are the consequences of inflammations, and these produce a variety of events as they are differently complicated with other disorders, it will be proper first to make some enquiry into their disposition. Inflammations from all causes have three ways of terminating; either by dispersion, suppuration, or gangrene; a schirrhous gland is always mentioned as a fourth, but, I think, with impropriety, since it seldom or never occurs but in venereal, scrophulous, or cancerous cases, when it is the fore-runner, and not the consequence, of an inflammation, the tumour generally appearing some time before the discolouration.

But though every kind of inflammation will sometimes terminate in different shapes, yet a probable conjecture of the event may be always gathered from the state of the patient's health. Thus, inflammations happening in a slight degree upon colds, and without any foregoing indisposition, will most probably be dispersed; those which follow close upon a fever, or happen to a very gross habit of body, will generally imposthumate; and those which fall upon very old people, or dropsical constitutions, will have a strong tendency to gangrene.

If the state of an inflammation be such as to make the dispersion of it safely practicable, that end will be best brought about by evacuations, such as plentiful bleeding and repeated purges. The part itself must be treated with fomentations twice a day; and if the skin be very tense, it may be embrocated with a mixture of three-fourths of oil of roses, and one-fourth of common vinegar, and afterwards be covered with *unguent. flor. sulph.* or a soft ointment made of white wax and sweet oil, spread upon a fine rag, and rolled on gently. I know that almost all surgeons are averse to the application of any thing unctuous to an inflamed skin, upon the supposition of its obstructing the pores, and by that means preventing the transpiration of the obstructed fluids, which is imagined to be one of the ways that an inflammation is removed. But whether this reasoning be founded on practice, or theory only, I am not clear; though I think it very certain, that inflammations, left to themselves, often grow stiff and painful, and are to be eased by any medicine that makes them more soft and pliable; which should not incline us to believe, that relaxing medicines interrupted the disposition to a cure. However, to preserve some sort of medium, in inflammations of the face (where they are esteemed most dangerous,

dangerous) it may be made a rule to use nothing more oily than warm milk, with which the face may be embrocated five or six times a day. If after four or five days, the inflammation begins to subside, the purging waters and manna may take place of other purges, and the embrocation of oil and vinegar be now omitted, or sooner, if it has begun to excoriate. The ointment of wax and oil may be continued to the last: or if, upon conclusion of the cure, the itching of the skin should be troublesome, it may better be relieved by the application of nutritum, which is an ointment made of equal parts of diachylon and sweet oil, melted softly down, and afterwards stirred together with a little addition of vinegar till they are cold. During the cure, a thin diet is absolutely necessary, and, in the height of the inflammation, the drinking of thin liquors is of great service.

Here I have supposed that the inflammation had so great a tendency to discussion, as by the help of proper assistance to terminate in that manner; but when it happens that the disposition of the tumour resists all discutient means, we must then desist from any farther evacuations, and, as much as we can, assist nature in the bringing on a suppuration.

That matter will most likely be formed, we may judge from the increase of the symptomatic fever, and enlargement of the tumour, with more pain and pulsation; and if a small rigour come on, it is hardly to be doubted. Inflammations after a fever, and the small-pox, almost always suppurate; but these presently discover their tendency, or at least should be at first gently treated, as though we expected an impostumation. It is a maxim laid down in surgery, that evacuations are pernicious in every circumstance of a disease, which is at last to end in suppuration: but as physicians do now acknowledge, that bleeding on certain occasions in the small-pox, is not only no impediment to the maturation, but even promotes it; so, in the formation of abscesses, when the vessels have been clogged, and the suppuration has not kindly advanced, bleeding has sometimes quickened it exceedingly; but, however, this practice is to be followed with caution. Purges are, no doubt, improper at this time; yet if the patient be costive, he must be assisted with gentle clysters every two or three days.

Of all the applications invented to promote suppuration, there are none so easy as pultices; but as there are particular tumours very slow of suppuration, and almost void of pain (such, for instance, are some of the scrophulous swellings) it will be less troublesome in these cases to wear the gum-plasters, which may be renewed every four or five days only. Amongst the suppurative pultices, perhaps there is none preferable to that made of bread and milk softened with oil; at least, the advantage of any other over it, is not to be distinguished in practice. The use of suppurative plasters in hasty abscesses, or inflammations in a weak or dropsical habit of body, is by no means adviseable, as they are apt to sit uneasy on the inflammation, are often painful to remove when we enquire into the state of the tumour, and by their compress in bad constitutions, add something to the disposition of the part to mortify. The abscess may be covered with the pultice twice a day, till it be come to that ripeness as to require opening, which will be known by the thinness and eminence of the skin in some part of it, a fluctuation of the matter, and, generally speaking, an abatement of the pain previous to these appearances. The manner of opening an abscess I shall describe after having spoken of a gangrene, which is the other consequence of an inflammation.

The signs of a gangrene are these: the inflammation loses its redness, and becomes duskish and livid; the tenseness of the skin goes off, and feels to the

the touch, flabby or emphysematous; vesications filled with ichor of different colours spread all over it: the tumour subsides, and from a duskish complexion, turns black; the pulse quickens and sinks, and profuse sweats coming on, at last grow cold, and the patient dies.

To stop the progress of a mortification, the method of treatment will be nearly the same, from whatever cause it may proceed, except in that arising from cold; in which case we ought to be cautious not to apply warmth too suddenly to the part; if it be true, that in the northern countries they have daily conviction of gangrenes produced by this means, which might have been easily prevented by avoiding heat; nay, they carry their apprehension of the danger of sudden warmth so far, as to cover the part with snow first, which, they say, seldom fails to obviate any ill consequence.

The practice of scarifying gangrenes by several incisions is almost universal, and I think with reason, since it not only sets the parts free, and discharges pernicious ichor, but makes way for whatever efficacy there may be in topical applications. These are different with different surgeons; but I believe the digestives, softened with oil of turpentine, are as good dressings as any for the scarifications; and upon them, all over the part, may be laid the *theriaca Londinensis*, which should be always used in the beginning of a gangrene, before the necessity of scarifying arises; or what is equally good, if not often preferable, a cataplasm made with lixivium and bran, and applied warm, which will retain its heat better than most other topicals. There are some who insist upon having had particular success in the stopping of gangrenes from the use of the grounds of strong beer, mixed with bread or oatmeal; but there are hardly any facts less proper to infer from, than the ceasing of a mortification, since we see, amongst the poor that are brought into the hospitals, how often it happens without any assistance; however, it is certain that service may be done by spirituous fomentations, and the dressings above mentioned, which are to be repeated twice a day; medicines also given internally are beneficial, and these should consist of the cordial kind, though at present the bark is ordered by a great many surgeons as the sovereign remedy for this disorder. After the separation of the eschar, the wound becomes a common ulcer, and must be treated as such.

There are two ways of opening an abscess; either by incision or caustick; but incision is preferable in most cases. In small abscesses, there is seldom a necessity for greater dilatation than a little orifice made with the point of a lancet; and in large ones, where there is not a great quantity of skin discoloured and become thin, an incision to their utmost extent will usually answer the purpose; or, if there be much thin discoloured skin, a circular or oval piece of it must be cut away; which operation, if done dexterously with a knife, is much less painful than by caustic, and at once lays open a great space of the abscess, which may be dressed down to the bottom, and the matter of it be freely discharged; whereas, after a caustic, though we make incisions through the eschar, as is the usual practice, yet the matter will be under some confinement, and we cannot have the advantage of dressing properly, till the separation of the slough, which often requires a considerable time, so that the cure must be necessarily delayed besides, that the pain of burning continuing two or three hours, which a caustic usually requires in doing its office, draws such a fluxion upon the skin round the eschar, as sometimes to indispose it very much for healing afterwards. In the use of caustics, it is but too much a practice to lay a small one on the most prominent part of a large tumour, which

which not giving ſufficient vent to the matter, and perhaps the orifice ſoon after growing narrow, leads on to the neceſſity of employing tents; which two circumſtances, more frequently make fiſtulas after an abſceſs, than any malignity in the nature of the abſceſs itſelf. The event would more certainly be the ſame after a ſmall inciſion; but I obſerve, that ſurgeons not depending ſo much on ſmall openings by inciſion, as by cauſtic, do, when they uſe the knife, generally dilate ſufficiently; whereas, in the other way, a little opening in the moſt depending part of the tumour, uſually ſatisfies them: but as the method of making ſmall orifices for great diſcharges, is for the moſt part tedious of cure, very often requiring dilatation at laſt, and now and then pernicious in the conſequence above mentioned, and even making the adjacent bones carious, I thought it might not be uſeleſs to caution againſt this practice.

Here it may not be amiſs to obſerve, that notwithſtanding the depending part of an abſceſs is eſteemed the moſt eligible for an opening, yet it is always on the ſuppoſition that the teguments are as thin in that place as any other part of it; otherwiſe it will be generally adviſeable to make the inciſion where nature indicates, that is, where the tumour is inflamed and prominent, though it ſhould not be in a depending part.

The indiſcriminate application of cauſtics to all abſceſſes, often runs into the ſame miſchief of tedioufneſs in the cure, from a cauſe exactly the reverſe of that I have been deſcribing; for as in great ſwellings they are ſeldom laid on large enough, and the matter continues draining for want of a ſufficient opening; ſo, in ſmall ones, they make a greater opening than is neceſſary, and therefore demand a greater length of time to repair the wound. I confeſs the diſpoſition of abſceſſes to fill up, after the diſcharge of matter, is ſo very different, that ſome few large ones do well after the mere puncture of a lancet, if the orifice be made in a depending part, and a proper bandage can be applied; though if ever we truſt to ſuch an opening, it ſhould be in abſceſſes about the face, where we ſhould be more careful to avoid the deformity of a ſcar, than in any other part, and where alſo the method will be more likely to ſucceed, from their ſituation; it being a maxim in ſurgery, that abſceſſes and ulcers will have a greater or leſs tendency to heal, as they are higher or lower in the body; however, even in abſceſſes of the face, if the ſkin be very thin, it will be always ſafer to open the length of it, than truſt to a puncture only.

From this account of the method of opening abſceſſes, it does not appear often neceſſary to apply cauſtics; yet they have their advantages in ſome reſpects, and are ſeldom ſo terrible to patients as the knife, though in fact they are frequently more painful to bear; they are of moſt uſe in caſes where the ſkin is thin and inflamed, and we have reaſon to think the malignity of the abſceſs is of that nature as to prevent a quickneſs of incarning, in which circumſtance, if an inciſion only were made through the ſkin, little ſinuſes would often form, and burrow underneath, and the lips of it lying looſe and flabby, would become callous, and retard the cure, though the malignity of the wound were corrected: of this kind are venereal buboes, which notwithſtanding they often do well by mere inciſion, yet when the ſkin is in the ſtate I have ſuppoſed, the cauſtic is always preferable, as I have had many opportunities of being convinced. It is to be obſerved, I confine this method to venereal buboes; for thoſe which follow a fever, or the ſmall-pox, for the moſt part are curable by inciſion only. There are many ſcrophulous tumours, where the reaſoning is the ſame as in the venereal; and even in

in great ſwellings where I have recommended inciſion, if the patient will not ſubmit to cutting, and the ſurgeon is apprehenſive of any danger in wounding a large veſſel, which is often done with the knife (though it may readily be taken up with the needle and ligature) yet as this inconvenience is avoided by cauſtic, it may on ſuch an occaſion be made uſe of; but I think after the eſchar is made, it ſhould be cut almoſt all away, which will be no pain to the patient, and will give a much freer diſcharge to the matter than inciſions made through it: however, in ſcrophulous ſwellings of the neck and face, unleſs they are very large, cauſtics are not adviſeable, ſince in that part of the body, with length of time, they heal after inciſion. Cauſtics are of great ſervice in deſtroying ſtubborn ſcrophulous indurations of the glands, alſo venereal indurations of the glands of the groin, which will neither diſcuſs nor ſuppurate; likewiſe in expoſing carious bones, and making large iſſues. The beſt cauſtic in uſe, is a paſte made with lime and *liximium capitale*, which is to be prevented from ſpreading by cutting an orifice in a piece of ſticking plaſter, nearly as big as you mean to make the eſchar, which being applied to the part, the cauſtic muſt be laid on the orifice, and preſerved in its ſituation by a few ſlips of plaſter laid round its edges, and a large piece over the whole. When iſſues are made, or bones expoſed, the eſchar ſhould be cut out immediately, or the next day; for if we wait the ſeparation, we miſcarry in our deſign of making a deep opening; ſince ſloughs are ſhung off by the ſprouting new fleſh underneath, which fills up the cavity at the ſame time that it diſcharges the eſchar; ſo that we are obliged afterwards to make the opening a ſecond time with painful eſcharotic medicines. To make an iſſue, or lay a bone bare, this cauſtic may lie on about four hours; to deſtroy a large gland, five or ſix; and to open an abſceſſes, an hour and a half, two hours, or three hours, according to the thickneſs of the ſkin; and what is very remarkable, notwithſtanding its ſtrength and ſudden efficacy, it frequently gives no pain where the ſkin is not inflamed, as in making iſſues, and opening ſome few abſceſſes.

Hitherto I have ſuppoſed the ſurgeon has had the opportunity of opening the tumour at the moſt eligible time, that is, when the ſkin is thin, and the fluctuation of the matter very ſenſible; which is always to be waited for, notwithſtanding it be very much taught, to open critical abſceſſes before they come to an exact ſuppuration, in order to give vent ſooner to the noxious matter of the diſeaſe; but in opening before this period, practitioners miſs the very deſign they aim at, ſince but little matter is depoſited in the abſceſs before it arrives towards its ripeneſs, and beſides, the ulcer afterwards grows foul, and is leſs diſpoſed to heal.

When an abſceſs is already burſt, we are to be guided by the probe where to dilate, obſerving the ſame rules with regard to the degree of dilatation, as in the other caſe; the uſual method of dilating is with the probe-ſciſſars; and, indeed, in all abſceſſes the generality of ſurgeons uſe the ſciſſars, after having firſt made a puncture with a lancet; but as the knife operates much more quickly, and with leſs violence to the parts, than ſciſſars, which ſqueeze at the ſame time that they wound, it will be ſparing the patient a great deal of pain to uſe the knife, wherever it is practicable, which is in almoſt all caſes, except ſome fiſtulas in *ano*, where the ſciſſars are more convenient. The manner of opening with a knife, is by ſliding it on a director, the groove of which prevents its being miſguided. If the orifice of the abſceſs be ſo ſmall as not to admit the director, or the blade of the ſciſſars, it muſt be en-

larged by a piece of ſponge tent, which is made by dipping a dry bit of ſponge in melted wax, and immediately ſqueezing as much out of it again as poſſible, between two pieces of tile or marble; the effect of which is, that the looſe ſponge being compreſſed into a ſmall compaſs, if any of it be introduced into an abſceſs, the heat of the part melts down the remaining wax that holds it together, and the ſponge ſucking up the moiſture of the abſceſs, expands, and in expanding, opens the orifice wider, and by degrees, ſo as to give very little pain.

The uſual method of dreſſing an abſceſs, the firſt time, is with dry lint only, or if there be no flux of blood, with ſoft digeſtives ſpread on lint. If there be no danger of the upper part of the wound re-uniting too ſoon, the doſſils muſt be laid in looſe; but if the abſceſs be deep, and the wound narrow, as is the caſe ſometimes of abſceſſes in *ano*, the lint muſt be crammed in pretty tightly, that we may have afterwards the advantage of dreſſing down to the bottom without the uſe of tents, which are almoſt univerſally decried in theſe days, though they ſtill continue to be employed too much by the very people who would ſeem to explode them moſt; ſo difficult is it to be convinced of the true efficacy of nature in the healing of wounds. Formerly the virtues of tents have been much inſiſted on, as it was then thought abſolutely neceſſary to keep wounds open a conſiderable time, to give vent to the imaginary poiſon of the conſtitution; it was ſuppoſed too, that they were beneficial in conveying the proper ſuppurative or ſarcotic medicines down to the bottom of the abſceſs; and again, that by abſorbing the matter, they preſerved the cleanlineſs of the wound, and diſpoſed it to heal. But this reaſoning is not now eſteemed of any force; ſurgeons at preſent know that a wound cannot heal too faſt, provided that it heal firmly from the bottom; they are very well ſatisfied alſo, from what they ſee in wounds, where no medicines are applied, that nature of herſelf ſhoots forth new fleſh, and is interrupted by any preſſure whatſoever; beſides, as to the conceit of tents ſucking up the matter which is eſteemed noxious to healing, they are ſo far from being beneficial in the performance of it, that they are of great prejudice; for if the matter be offenſive in its nature, though they do abſorb it, they bring it into contact with every part of the ſinus; and if it be prejudicial by its quantity, they do miſchief in locking it up in the abſceſs, and preventing the diſcharge it would find, if the dreſſings were only ſuperficial; but in fact, matter, when it is good, is of no diſſervice to wounds with regard to its quality; and ſurgeons ſhould therefore be leſs curious in wiping them clean, when they are tender and painful. That tents are impediments to healing rather than aſſiſtants, we may learn from conſidering the effect of a pea in an iſſue, which by preſſure keeps open the wound juſt as tents do; and if there are inſtances of wounds healing very well notwithſtanding the uſe of tents, ſo there are alſo of iſſues healing up, in ſpite of any meaſures we can take to keep a pea in its cavity. In ſhort, tents in wounds, by reſiſting the growth of the little granulations of fleſh, in proceſs of time harden them, and in that manner produce a fiſtula; ſo that inſtead of being uſed for the cure of an abſceſs, they never ſhould be employed but where we mean to retard the healing of the external wound, except in ſome little narrow abſceſſes, where if they be not crammed in too large, they become as doſſils, admitting of incarnation at the bottom; but care ſhould be taken, not to inſinuate them much deeper than the ſkin in this caſe, and that they ſhould be repeated twice a day, to give vent to the matter they confine. Sometimes they are of ſervice in large abſceſſes, particularly of the breaſt, where

where the matter cannot discharge itself by the orifice already made, and yet does not point sufficiently to any other part for an opening, though it make signs whither it would tend, if it were a little confined. In such an instance, a tent plugging up the orifice, would make the matter recur to the part disposed to receive it, and mark the place for a counter-opening: but tents do most good in little deep abscesses, whence any extraneous body is to be evacuated, such as small splinters of bone, &c.

The use of vulnerary injections into abscesses has been thought to bear so near a resemblance to the use of tents, that they both fell into disrepute almost at the same time. It has been said in their favour, that in deep abscesses, where no ointment can be applied, they digest, cleanse, and correct the malignity of the pus; but the fact is, that they do so much mischief by frequently distending the parts of the abscess, first, when they are injected, and afterwards, by their addition to the matter generated in the abscess, that they are hardly proper in any case: though one of the great mischiefs of injections and tents both, has been a mistaken faith amongst practitioners, that wherever their medicines were applied, the part would heal; and upon that presumption, they have neglected to dilate abscesses, which have not only remained incurable after this treatment, but would often have done so for want of a discharge, if they had been dressed more superficially.

In dressing wounds, it is common to apply the medicines warm, or hot, upon the supposition that heated ointments have a stronger power of digesting than cold; but as any medicine will soon arrive to the heat of the part it is laid on, whether it be applied hot or cold, the efficacy of the heat can avail but little in so small a time; and as dossils dipped in hot ointments are not cleanly, and even grow stiff and painful, besides that the patient is liable to be burnt by laying on too hot, I think it rather preferable to apply them cold, or perhaps in winter a little warmed before the fire after they are spread; observing, if the ulcer be uneven, to make the dossils small, in order to lie close. Over the dossils of lint may be laid a large pledgit of tow, spread with basilicon, which will lie softer than a defensative plaster; for this, though designed to defend the circumference of wounds against inflammation, or a fluxion of humours, is often the very cause of them; so that the dressings of large wounds should never be kept on by these plasters, where there is danger of such accidents; and it is on the account of the unfitness of plasters of any kind for an inflammation, that I have omitted to mention any of them as proper discutients in that disorder. In this manner the dressings may be continued till the cavity is incarned, and then it may be cicatrized with dry lint, or some of the cicatrizing ointments, observing to keep the fungus down, as directed before: if the drying ointment be the cerat. de lapid. calam. the stone must be thoroughly levigated before it be put into it, otherwise the ointment will be corrosive.

In the course of dressing, it will be proper to have regard to the situation of the abscess, and as much as possible to make the patient favour the discharge by his ordinary posture: and to this end also, as what is of greater importance than the virtue of any ointment, the discharge must be assisted by compress and bandage, the compress may be made of rags or plaster; though the latter is sometimes preferable, as it remains immoveable on the part it is applied to. The frequency of dressing will depend on the quantity of discharge; once in twenty-four hours is ordinarily sufficient; but sometimes twice, or perhaps three times, is necessary. I have before mentioned, not to be too scrupulously

pulouſly nice in cleaning a wound; but it is worth remarking, that a ſore ſhould never be wiped by drawing a piece of tow or rag over it, but only by dabbing it with fine lint, which is a much eaſier method for the patient: the parts about it may be wiped clean in a rougher manner, without any prejudice. I do not think the air has that ill effect on ſores as is generally conceived; nor would the large abſceſſes on beaſts, which are often expoſed to the air the whole time of cure, do well, if it were ſo very pernicious as is repreſented; but as it tends to the making a ſcab, and in winter is a little painful to the new fleſh, it will be right to finiſh the dreſſing as quick as may be, without hurrying. Another caution neceſſary in the treatment of abſceſſes, is, that ſurgeons ſhould not upon all occaſions ſearch into their cavities with the finger or probe, as it often tears them open, and indiſpoſes them for a cure.

CHAP. III.

OF ULCERS.

WHEN a wound or abſceſs degenerates into ſo bad a ſtate as to reſiſt the uſual methods of cure I have hitherto laid down, and loſes that complexion which belongs to a healing wound, it is called an *Ulcer*; and as the name is generally borrowed from the ill habit of the ſore, it is a cuſtom to apply it to all ſores that have any degree of malignity, though they be immediately formed without any previous abſceſs or wound; ſuch are the venereal ulcers of the tonſils, &c. &c.

Ulcers are diſtinguiſhed by their particular diſorders, though it ſeldom happens that the affections are not complicated; and when we lay down rules for the management of one ſpecies of ulcer, it is generally requiſite to apply them to almoſt all others. However, the characters of moſt eminence are, the callous ulcer, the ſinuous ulcer, and the ulcer with caries of the adjacent bone: though there be abundance more known to ſurgeons, ſuch as the putrid, the coroſive, the varicous, &c. but as they have all acquired their names from ſome particular affection, I ſhall ſpeak of the treatment of them under the general head of ulcers.

It will be often in vain to purſue the beſt means of cure by topical application, unleſs we are aſſiſted by internal remedies; for as many ulcers are the effects of a particular indiſpoſition of body, it will be difficult to bring them into order, while the cauſe of them remains with any violence; though they are ſometimes in a great degree the diſcharge of the indiſpoſition itſelf, as in the plague, ſmallpox, &c. But we ſee it generally neceſſary in the pox, the ſcurvy, obſtructions of the menſes, dropſies, and many other diſtempers, to give internals of great efficacy; and indeed there are hardly any conſtitutions, where ulcers are not aſſiſted by ſome phyſicial regimen. Thoſe that are cancerous and ſcrophulous, ſeem to gain the leaſt advantage from phyſic; for if in their beginnings they have ſometimes been very much relieved, or cured by ſalivation, or any other evacuation, they are alſo often irritated, and made worſe by them; ſo that there is nothing very certain in the effects of violent medicines in theſe diſtempers. I have ſeen alſo great quantities of alteratives tried on a variety of ſubjects, but I cannot ſay with extraordinary ſucceſs: upon the whole, I think in both theſe caſes the milk-diet, and gentle purging with manna, and the waters, ſeem to be moſt efficacious; though briſk methods may be uſed with more ſafety in the evil than the cancer; and ſometimes, particularly in young ſubjects, the decoction of the woods is extremely beneficial for ſcrophulous ulcers: but it has lately been atteſted by men

of

of great ſkill and veracity, that ſea-water is more powerful than any other remedy hitherto known, both for ſcrophulous ulcers, and ſcrophulous tumours.

When an ulcer becomes foul, and diſcharges a naſty thin ichor, the edges of it, in proceſs of time, tuck in, and growing ſkinned and hard, give it the name of a callous ulcer, which, ſo long as the edges continue in that ſtate, muſt neceſſarily be prevented from healing: but we are not immediately to deſtroy the lips of it, in expectation of a ſudden cure; for while the malignity of the ulcer remains, which was the occaſion of the calloſity, ſo long will the new lips be ſubject to a relapſe of the ſame kind, however often the external ſurface of them be deſtroyed; ſo that when we have to deal with this circumſtance, we are to endeavour to bring the body of the ulcer into a diſpoſition to recover by other methods. It ſometimes happens to poor laborious people, who have not been able to afford themſelves reſt, that lying a-bed will in a ſhort time give a diverſion to the humours of the part, and the callous edges ſoftening, will, without any great aſſiſtance, ſhoot out a cicatrix, when the ulcer is grown clean and filled with good fleſh. The effect of a ſalivation is generally the ſame; and even an iſſue does ſometimes diſpoſe a neighbouring ulcer to heal: but though calloſities be frequently ſoftened by theſe means, yet when the ſurface of the ulcer begins to yield thick matter, and little granulations of red fleſh ſhoot up, it will be proper to quicken nature by deſtroying the edges of it, if they remain hard. The manner of doing this is by touching them a few days with the lunar cauſtic, or lapis infernalis, and ſome choofe to cut them off with a knife; but this laſt method is very painful, and not, as I can perceive, more efficacious; though when the lips do not tuck down cloſe to the ulcer, but hang looſe over it, as in ſome venereal buboes, where the matter lies a great way under the edges of the ſkin, the eaſieſt method is cutting them off with the ſciſſars.

To digeſt the ulcer, or to procure good matter from it when in a putrid ſtate, there are an infinity of ointments invented; but the baſilicon flavum alone, or ſoftened down ſometimes with turpentine, and ſometimes mixed up with different proportions of red precipitate, ſeems to ſerve the purpoſes of bringing an ulcer on to cicatrization, as well as any of the others. When the ulcer is incarned, the cure may be finiſhed as in other wounds; or if it do not cicatrize kindly, it may be waſhed with aq. calcis, or aq. phag. or dreſſed with a pledgit dipped in tinct. myrrhæ: and if excoriations are ſpread round the ulcer, they may be anointed with ſperm. cet. ointment, or unguent. nutritum.

The red precipitate has of late years acquired the credit it deſerves for the cure of ulcers, but by falling into general uſe, is often very unſkilfully applied; when mixed with the baſilicon, or what is neater, a cerate of wax and oil, it is moſt certainly a digeſtive, ſince it hardly ever fails to make the ulcer yield a thick matter in twenty-four hours, which diſcharged a thin one before the application of it. As greater proportions of it are added to the cerate, it approaches to an eſcharotic; but while it is mixed with any ointment, it is much leſs painful and corroſive than when ſprinkled on a ſore in powder; though in this form it is almoſt univerſally employed, but I think injudiciouſly; for as it is a ſtrong eſcharotic, much of it can never be uſed without making a ſlough, and therefore continually repeating it day after day, will be making a ſucceſſion of ſloughs; or if it be ſprinkled on a ſlough already formed, in order to quicken the ſeparation of it, ſo much of the powder as lies

lies on the dead ſurface, will be of no force, and the reſt that lies at the bottom, and about it, will produce other ſloughs there, by keeping under and deſtroying the little granulations of fleſh which in their growth would elevate and puſh off the firſt ſlough, ſo that it cannot be a proper remedy in this caſe. If it be anſwered, that daily practice ſhould convince us that precipitate has not this ill effect, ſince we ſee ſloughs continually ſeparating, notwithſtanding the uſe of it; the ſame ſort of argument may be uſed in favour of any bad practice, ſince nature often ſurmounts the greateſt obſtacles to a cure: but whoever will attend carefully, without any prejudice from this reaſoning, to the two methods of promoting the ſeparation of an eſchar, will find it not only more eaſily, but alſo more readily effected by ſoft digeſtives, or the precipitate medicine, than by a great quantity of the powder.

If the ulcer ſhould be of ſuch a nature as to produce a ſpongy fleſh, ſprouting very high above the ſurface, it will be neceſſary to deſtroy it by ſome of the eſcharotics, or the knife. This fungus differs very much from that belonging to healing wounds, being more eminent and lax, and generally in one maſs; whereas the other is in little diſtinct protuberances. It approaches often towards a cancerous complexion, and when it riſes upon ſome glands does actually degenerate ſometimes into a cancer, as has happened in buboes of the groin. When theſe excreſcences have ariſen in venereal ulcers, I have pared them with a knife; but the flux of blood is ordinarily ſo great, that I do not recommend the method, and rather prefer the eſcharotics. Thoſe in uſe are the vitriol, the lunar cauſtic, and the lapis infernalis, and more generally the red precipitate powder; but even in this caſe, I do not think that powder the beſt remedy; for though I have ſaid it is always an eſcharotic, yet the pulv. angel. which is a compoſition of the precipitate powder and burnt alum, eats deeper, and I think is preferable to the precipitate alone.

It is but ſeldom that theſe inveterate funguſes appear on an ulcer; but it is very uſual for thoſe of a milder kind to riſe, which may often be made to ſubſide with preſſure, and the uſe of mild eſcharotics; however, if the aſpect of the ſore be white and ſmooth, as happens in ulcers accompanied with a dropſy, and often in young women with obſtructions, it will anſwer no purpoſe to waſte the excreſcences till the conſtitution is repaired, when moſt probably they will ſink without any aſſiſtance. In ulcers alſo, where the ſubjacent bone is carious, great quantities of looſe flabby fleſh will grow up above the level of the ſkin; but as the caries is the cauſe of the diſorder, it will be in vain to expect a cure of the excreſcence, till the rotten part of the bone be removed; and every attempt with eſcharotics will be only a repetition of pain to the patient without any advantage. In ſcrophulous ulcers of the glands, and indeed of almoſt every part, this diſorder is very common; but before trial of the ſevere eſcharotics, I would recommend the uſe of the ſtrong precipitate medicine, with compreſs as tight as can be boren without pain, which I think generally keeps it under.

When the excreſcence is cancerous, and does not riſe from a large cancer, but only from the ſkin itſelf, it has been uſual to recommend the actual cautery; though I have found it more ſecure to cut away quite underneath, and dreſs afterwards with eaſy applications; but the caſes where either of theſe methods are practicable, occur very rarely. As to the treatment of incurable cancerous ulcerations, after much trial, ſurgeons have at laſt diſcovered, that what gives the moſt eaſe to the ſore is the moſt ſuitable application; and therefore the uſe of eſcharotics is not to be admitted on any pretence whatſoever; nor in thoſe

parts

parts of a cancer that are corroded into cavities, muſt the precipitate be made uſe of to procure digeſtion, or promote the ſeparation of the ſloughs. The beſt way, therefore, is to be guided by the patient what medicine to continue, after having tried three or four, if the firſt or ſecond do not agree with him. Thoſe uſually preſcribed are preparations from lead; but what I have found moſt beneficial, have been ſometimes dry lint alone, when it does not ſtick to the cancer; at other times, lint doſſils ſpread with baſilicon or cerat. de lapid. calam. and oftener than either with a cerate made of oil and wax, or the ſperm. cet. ointment; and over all, a pledget of tow ſpread with the ſame. Embrocating the neighbouring ſkin and edges of it with milk is of ſervice, but the chief good is to be acquired by diet, which ſhould be altogether of milk, and things made of milk, though herbage may be admitted alſo. Iſſues in the ſhoulders or thighs do alſo alleviate the ſymptoms, and manna with the purging waters, once, or perhaps twice a week, will ſerve to keep the body cool. All methods more violent generally exaſperate cancers, and are to be rejected in favour of this, which is ſometimes amazing in its effects, not only procuring eaſe, but lengthening life.

When ulcers or abſceſſes are accompanied with inflammation and pain, they are to be aſſiſted with fomentations made of ſome of the dry herbs, ſuch as Roman wormwood, bay leaves, and roſemary; and when they are very putrid and corroſive, which circumſtances give them the name of foul phagædenic ulcers, ſome ſpirits of wine ſhould be added to the fomentation, and the bandage be alſo dipped in brandy or ſpirits of wine, obſerving, in theſe caſes where there is much pain, always to apply gentle medicines till it be removed.

As to the frequency of dreſſing and fomenting, I think it may be laid down for a rule in all ſores, that where the diſcharge is ſanious and corroſive, twice a-day is not too much: if the matter be not very putrid and thin, once will ſuffice. When the pain and inflammation are exceſſive, bleeding and other evacuations will often be ſerviceable; and above all things, reſt and a horizontal poſition; which laſt circumſtance is of ſo great importance to the cure of ulcers of the legs, that unleſs the patient will conform to it ſtrictly, the ſkill of the ſurgeon will often avail nothing; for as the indiſpoſition of theſe ſores is in ſome meaſure owing to the gravitation of the humours downwards, it will be much more beneficial to lie along than ſit upright, though the leg be laid on a chair; ſince even in this poſture they will deſcend with more force than if the body was reclined.

In ulcers of the legs accompanied with varices or dilatations of the veins, the method of treatment will depend upon the other circumſtances of the ſore; for the varix can only be aſſiſted by the application of bandage, which muſt be continued a conſiderable time after the cure; the neateſt bandage is the ſtraight ſtocking, which is particularly ſerviceable in this caſe; though alſo if the legs be œdematous, or if after the healing of the ulcers they ſwell when the patient quits his bed, it may be woren with ſafety and advantage. There are inſtances of one vein only being varicous, which when it happens may be deſtroyed by tying it above and below the dilatation; as in an aneuriſm; but this operation ſhould only be practiſed where the varix is large and painful.

Ulcers of many years ſtanding are very difficult of cure, and in old people the cure is often dangerous, frequently exciting an aſthma, a diarrhœa, or a fever, which deſtroys the patient unleſs the ſore break out again; ſo that it is not altogether adviſeable to attempt the abſolute cure in ſuch caſes, but only the reduction of them into better order, and

and less compass, which, if they be not malignant, is generally done with rest and proper care. The cure of those in young people may be undertaken with more safety, but we often find it necessary to raise a salivation to effect it, though when completed it does not always last; so that the prospect of cure in stubborn old ulcers, at any time of life, is but indifferent. In all these cases, however, it is proper to purge once or twice a week with calomel, if the patient can bear it, and to make an issue when the sore is almost healed, in order to continue a discharge the constitution has been so long habituated to, and prevent its falling upon the cicatrix, and bursting out again in that place.

When an ulcer or abscess has any sinuses or channels opening and discharging themselves into the sore, they are called sinuous ulcers; these sinuses, if they continue to drain a great while, grow hard in the surface of their cavity, and then are termed fistulæ, and the ulcer a fistulous ulcer; also if matter be discharged from any cavity, as those of the joints, the abdomen, &c. the opening is called a sinuous ulcer, or a fistula.

The treatment of these ulcers depends on a variety of circumstances; if the matter of the sinus be thick, strict bandage and compress will sometimes bring the opposite sides of the sinus to a re-union; if the sinus grow turgid in any part, and the skin thinner, shewing a disposition to break, the matter must be made to push more against that part, by plugging it up with a tent; and then a counter-opening must be made, which proves often sufficient for the whole abscess, if it be not afterwards too much tented, which locks up the matter, and prevents the healing; or too little, which will have the same effect; for dressing quite superficially does sometimes prove as mischievous as tents, and for nearly the same reason, since suffering the external wound to contract into a narrow orifice before the internal one be incarned, does almost as effectually lock up the matter as a tent: to preserve then a medium in these cases, a hollow tent of lead or silver may be kept in the orifice, which at the same time that it keeps it open, gives vent to the matter. The abscesses where the counter-openings are made most frequently, are those of compound fractures, and the breast; but the latter do oftener well without dilatation than the former, though it must be performed in both if practicable the whole length of the abscess, when after some trial the matter does not lessen in quantity, and the sides of it grow thinner; and if the sinuses be fistulous, there is no expectation of cure without dilatation: there are also a great many scrophulous abscesses of the neck, that sometimes communicate by sinuses running under large indurations, in which instances, counter-openings are adviseable, and generally answer without the necessity of dilating the whole length; and indeed there are few abscesses in this distemper, which should be opened beyond the thinness of the skin. When abscesses of the joints discharge themselves, there is no other method of treating the fistula, but by keeping it open with the cautions already laid down, till the cartilages of the extremities of the bones being corroded, the two bones shoot into one another, and form an anchylosis of the joint, which is the most usual cure of ulcers in that part.

Gun-shot wounds often become sinuous ulcers, and then are to be considered in the same light as those already described; though surgeons have been always inclined to conceive there is something more mysterious in these wounds than any others; but their terribleness is owing to the violent contusion and laceration of the parts, and often to the admission of extraneous bodies into them, as the bullet, splinters, clothes, &c. and were any other force to do the same thing,

thing, the effect would be exactly the ſame as when done by fire-arms. The treatment of theſe wounds conſiſts in removing the extraneous body as ſoon as poſſible, to which end the patient muſt be put into the ſame poſture as when he received the wound: if it cannot be extracted by cutting upon it, which ſhould always be practiſed when the ſituation of the blood-veſſels, &c. does not forbid; it muſt be left to nature to work out, and the wound dreſſed ſuperficially; for we muſt not expect, that if it be kept open with tents, the bullet, &c. will return that way; and there is hardly any caſe where tents are more pernicious than here, becauſe of the violent tenſion and diſpoſition to gangrene which preſently enſue. To guard againſt mortification in this, and all other violently-contuſed wounds, it will be proper to bleed the patient immediately, and ſoon after give a elyſter; the part ſhould be dreſſed with ſoft digeſtives, and the compreſs and roller applied very looſe, being firſt dipt in brandy or ſpirits of wine: the next time the wound is opened, if it be dangerous, the ſpirituous fomentation may be employed, and after that continued till the danger is over. If a mortification comes on, the applications for that diſorder muſt be uſed: in gun-ſhot wounds, it ſeldom happens that there is any effuſion of blood, unleſs a large veſſel be torn, but the bullet makes an eſchar, which uſually ſeparates in a few days, and is followed with a plentiful diſcharge; but when the wound is come to this period, it is manageable by the rules already laid down.

When an ulcer with looſe rotten fleſh diſcharges more than the ſize of it ſhould yield, and the diſcharge is oily and ſtinking, in all probability the bone is carious, which may eaſily be diſtinguiſhed by running the probe through the fleſh, and if ſo, it is called a carious ulcer: the cure of theſe ulcers depends principally upon the removal of the rotten part of the bone, without which it will be impoſſible to heal, as we ſee ſometimes even in little ſores of the lower jaw, which taking their riſe from a rotten tooth, will not admit of cure till the tooth be drawn. Thoſe caries which happen from the matter of abſceſſes lying too long upon the bone, are moſt likely to recover; thoſe of the pox very often do well, becauſe that diſtemper fixes ordinarily upon the middle and outſide of the denſeſt bones which admit of exfoliation; but thoſe produced by the evil, where the whole extremities or ſpongy parts of the bone are affected, are exceedingly dangerous, though all enlarged bones be not neceſſarily carious; and there are ulcers ſometimes on the ſkin that covers them, which do not communicate with the bone, and conſequently do well without exfoliation: nay, it ſometimes happens, though the caſe be rare, that in young ſubjects particularly, the bones will be carious to ſuch a degree as to admit a probe almoſt through the whole ſubſtance of them, and yet afterwards admit of a cure without any notable exfoliation.

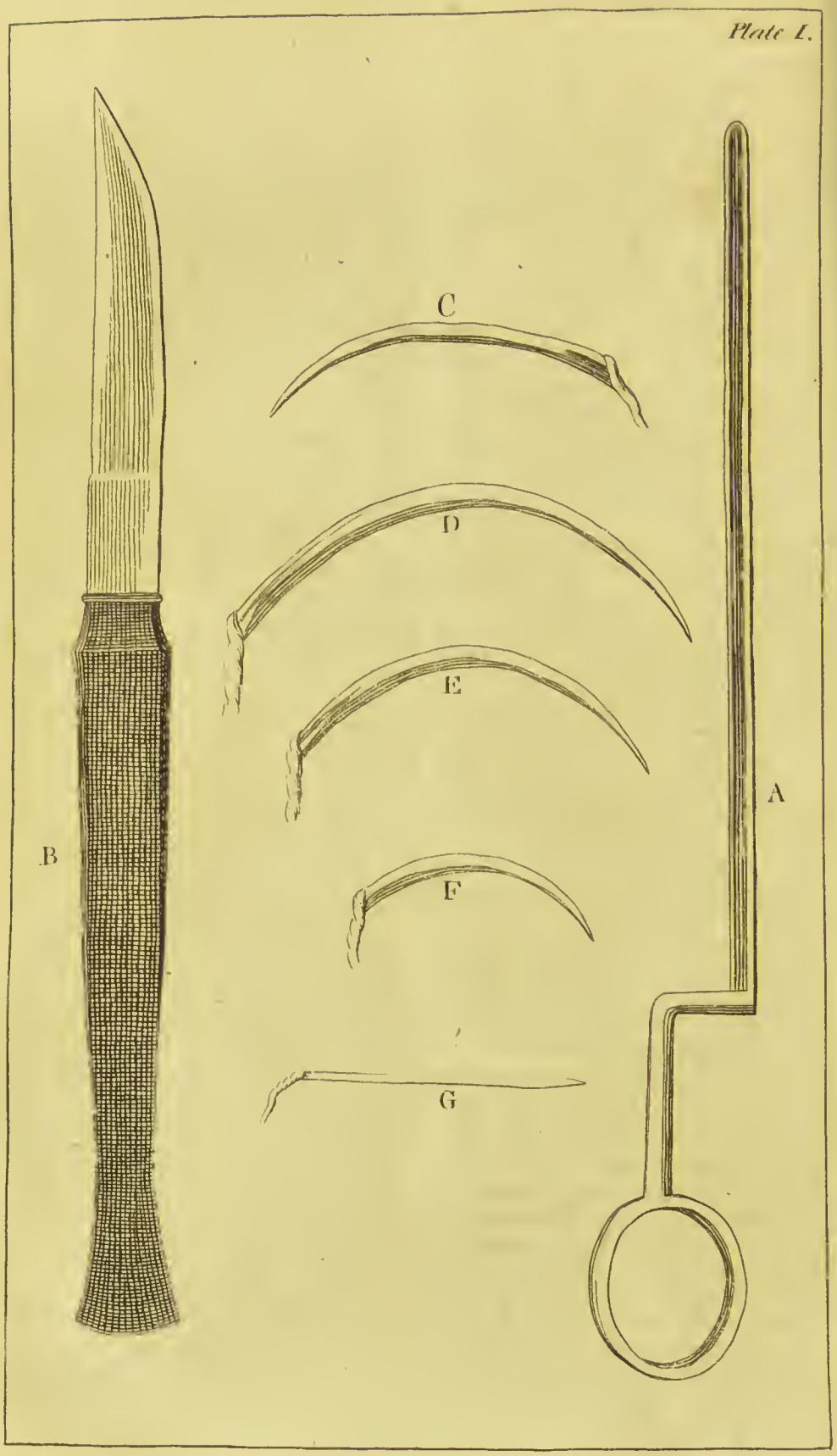
The method of treating an ulcer with a caries, is by applying a cauſtic of the ſize of the ſcale of the bone that is to be exfoliated, and after having laid it bare, to wait till ſuch time as the carious part can, without violence, be ſeparated, and then heal the wound. I caution againſt violence, becauſe the little jagged bits of bone that would be left, if we attempted exfoliation before the piece were quite looſe and diſengaged from the ſound bone, would form little ulcerations, and very much retard the cure. In order to quicken the exfoliation, there have been ſeveral applications deviſed, but that which has been moſt uſed in all ages, is the actual cautery, with which ſurgeons burn the naked bone every day, or every other day, to dry up, as they ſay, the moiſture, and by that means procure the ſeparation; but as this practice is never of great ſervice, and

always cruel and painful, it is now pretty much exploded: indeed, from considering the appearance of a wound when a scale of bone is taken out of it, there is hardly any question to be made, but that burning retards rather than hastens the separation; for as every scale of carious bone is flung off by new flesh generated between it and the sound bone, whatever would prevent the growth of these granulations, would also in a degree prevent the exfoliation, which must certainly be the effect of a red-hot iron, applied so close to it; though the circumstances of carious bones, and their disposition to separate, are so different from one another, that it is hardly to be gathered from experience, whether they will sooner exfoliate with or without the assistance of fire; for sometimes, in both methods, an exfoliation is not procured in a twelvemonth, and at other times it happens in three weeks or a month: nay, I have, upon cutting out the eschar made by the caustic, taken away at the same time a large exfoliation: however, if it be only uncertain whether the actual cautery be beneficial or not, the cruelty that attends the use of it should entirely banish it out of practice. It is often likewise, in these cases, employed to keep down the fungous lips that spread upon the bone; but it is much more painful than the escharotic medicines; though there will be no need of either, if a regular compress be kept on the dressings; or at worst, if a flat piece of the prepared sponge, of the size of the ulcer, be rolled on with a tight bandage, it will swell on every side, and dilate the ulcer without any pain.

Some caries of the bones are so very shallow that they crumble insensibly away, and the wound fills up; but when the bone will neither exfoliate nor admit of granulations, it will be proper to scrape it with a rugine, or perforate it in many points with a convenient instrument down to the quick. In the evil, the bones of the carpus and tarsus are often affected, but their sponginess is the reason that they are seldom cured: so that when these, or indeed the extremities of any of the bones, are carious through their substance, it is advisable to amputate; though there are instances in the evil, but more especially in critical abscesses, where, after long dressing down, the splinters, and sometimes the whole substance of the small bones, have worked away, and a healthy habit of body coming on, the ulcer has healed; but these are so rare, that no great dependence is to be laid on such an event. The dressings of carious bones, if they are stinking, may be dossils dipped in the tincture of myrrh, otherwise those of dry lint are easiest, and keep down the edges of the ulcer better than any other gentle applications.

Burns are generally esteemed a distinct kind of ulcers, and have been treated with a greater variety of applications than any other species of sore, every author having invented some new medicine to fetch out the fire, as they imagine; and indeed the conceit of a quantity of fire remaining in the part burnt, has occasioned the trial of very whimsical and painful remedies: though people who talk thus seriously of fire in wounds, do not think of any remaining in a stick that is half burnt, and ceases to burn any farther; notwithstanding the reasoning be the same in burns of the flesh and burns of a piece of wood.

When burns are very superficial, not raising suddenly any vesication, spirits of wine are said to be the quickest relief; but whether they be more serviceable than embrocations with linseed-oil I am not certain, though they are used very much by some persons whose trade subjects them often to this misfortune. If the burn excoriates, I think it is easiest to roll the part up gently with bandages dipped in sweet oil, or a mixture of unguent. flor. sambu. with the oil: when the excoriations are very tender, dropping warm milk upon them every dressing is very comfortable;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fortable; or if the patient can bear to have flannels wrung out of it, applied hot, it may be ſtill better: if the burn have formed eſchars, they may be dreſſed with baſilicon, though generally oil alone is eaſier; and in theſe ſores, whatever is the eaſieſt medicine, will be the beſt digeſtive. I have ſometimes found it neceſſary to apply different ointments to burns, where the aſpect has been nearly the ſame, and upon changing them, the patient has complained of great pain, ſo that we are obliged ſometimes to determine what is proper from trial. The moſt likely things to ſucceed at firſt, are oil, ungt. flor. ſamb. ungt. baſilicon, and a cerate of wax and oil, and afterwards the cerate de lapid. calam. ungt. rub. deſiccat. ungt. ſperm. cet. the nutritum with but little vinegar in it, or perhaps, when the fungus riſes, dry lint. There is great care neceſſary to keep down the fungus of burns, and heal the wound ſmooth, to which end the edges ſhould be dreſſed with lint dipped in aqu. vitriol. and dried afterwards; or they may be touched with the vitriol ſtone, and the dreſsings be repeated twice a day. There is alſo greater danger of contractions from burns after the cure, than from other wounds; to obviate which, embrocations of neats-foot oil, and bandage with paſte-boards, to keep the part extended, are abſolutely neceſſary, where they can be applied.

The EXPLANATION.

A. A director by which to guide the knife in the opening of abſceſſes that are burſt of themſelves, or firſt punctured with a lancet. This inſtrument ſhould be made either of ſteel, ſilver, or iron, but ſo tempered, that it may be bent and accommodated to the direction of the cavity. It is uſually made quite ſtraight; but that form prevents the operator from holding it firmly while he is cutting, upon which account I have given mine the ſhape here repreſented. The manner of uſing it, is by paſſing the thumb through the ring, and ſupporting it with the fore-finger, while the ſtraight-edged knife is to ſlide along the groove with its edge upwards, towards the extremity of the abſceſs.

B. The ſtraight-edged knife, proper for opening abſceſſes with the aſſiſtance of a director; but which, in few other reſpects, is preferable to the round-edged knife.

C. A crooked needle, with its convex and concave ſides ſharp. This is uſed only in the ſuture of the tendon, and is made thin, that but few of the fibres of ſo ſlender a body as the tendon may be injured in the paſſing of it. The needle is large enough for ſtitching the tendo Achilles.

D. The largeſt crooked needle neceſſary for tying of any veſſels, and ſhould be uſed with a ligature of the ſize of that I have threaded it with in taking up the ſpermatic veſſels in caſtration, or the femoral and humeral arteries in amputation. This needle may alſo be uſed in ſewing up deep wounds.

E. A crooked needle and ligature of the moſt uſeful ſize, being not much too little for the largeſt veſſels, nor a great deal too big for the ſmalleſt; and therefore in the taking up of the greateſt number of veſſels in an amputation, is the proper needle to be employed. This needle alſo is of a convenient ſize for ſewing up moſt wounds.

F. A ſmall crooked needle and ligature for taking up the leſſer arteries, ſuch as thoſe of the ſcalp, and thoſe of the ſkin that are wounded in opening abſceſſes. Great care ſhould be taken by the makers of theſe needles, to give them a due temper; for if they are too ſoft, the force ſometimes exerted to carry them through the fleſh, will bend them; if they are too brittle they ſnap; both which accidents may happen to be terrible inconveniencies, if the ſurgeon be not provided with a ſufficient number of them. It is of great importance alſo to give them the form of part of a circle, which makes them paſs much more readily round any veſſel, than if

if they were made partly of a circle, and partly of a ſtraight line; and in taking up veſſels at the bottom of a deep wound, is abſolutely neceſſary, it being impracticable to turn the needle with a ſtraight handle, and bring it round the veſſel when in that ſituation. The convex ſurface of the needle is flat, and its two edges are ſharp. Its concave ſide is compoſed of two ſurfaces, riſing from the edges of the needle, and meeting in a ridge or eminence, ſo that the needle has three ſides. This eminence of the ſubſtance of the needle on its inſide, ſtrengthens it very much, but it is not continued the whole length of the needle, which is flat towards the eye; ſome are made round in this part, but they cannot be held ſteady between the finger and thumb, and are therefore unfit for uſe. There have been needles made with the eminence on the convex ſide, and a flat ſurface on the concave ſide, but I do not ſee any particular advantage in that ſtructure. The beſt materials for making ligatures, are the flaxen thread that ſhoemakers uſe; which is ſufficiently ſtrong when four, ſix, or eight of the threads are twiſted together and waxed, and is not ſo apt to cut the veſſels as threads that are more finely ſpun; though the prevention of this accident will depend in a great meaſure on the dexterity of the operator, who is carefully to avoid the tying them with too great a force.

G. A ſtraight needle ſuch as glovers uſe, with a three-edged point, uſeful in the uninterrupted ſuture, in the ſuture of tendons, where the crooked one *C*, is not preferred, and in ſewing up dead bodies, and is rather more handy for taking up the veſſels of the ſcalp.

TREA-

A TREATISE ON THE OPERATIONS OF SURGERY.

CHAP. I.

OF SUTURES.

WHEN a wound is recent, and the parts of it are divided by a sharp instrument, without any farther violence, and in such a manner that they may be made to approach each other, by being returned with the hands, they will, if held in close contact for some time, re-unite by inosculation, and cement like one branch of a tree ingrafted on another. To maintain them in this situation, several sorts of sutures have been invented, and formerly practised, but the number of them has of late been very much reduced. Those now chiefly described, are the interrupted, the glover's, the quilled, the twisted, and the dry sutures; but the interrupted and twisted, are almost the only useful ones; for the quilled is never preferable to the interrupted; the dry suture is ridiculous in terms, since it is only a piece of plaster applied in many different ways to re-unite the lips of a wound: and the glover's or uninterrupted stitch, which is advised in superficial wounds, to prevent the deformity of a scar, does rather, by the frequency of the stitches, occasion it, and is therefore to be rejected in favour of a compress and sticking-plaster; the only instance where I would recommend it, is in a wound of the intestine: the manner of making this suture I shall describe in the chapter of Gastroraphy.

From the description I have given of the state of a wound proper to be sewed up, it may be readily conceived, that wounds are not fit subjects for suture, when there is either a contusion, laceration, loss of substance, great inflammation, difficulty of bringing

bringing the lips into apposition, or some extraneous body insinuated into them; though sometimes a lacerated wound may be assisted with one or two stitches. It has formerly been forbidden to sew up wounds of the head; but this precaution is very little regarded by the moderns; though the ill effects I have frequently seen from matter pent up under the scalp, and the great convenience there is of using bandage on the head, have convinced me, that much less harm would be done, if sutures were used in this part with more caution.

If we stitch up a wound that has none of these obstacles, we always employ the interrupted suture, passing the needle two, three, or four times, in proportion to the length of it, though there can seldom be more than three stitches required.

The method of doing it is this: the wound being emptied of the grumous blood, and your assistant having brought the lips of it together, that they may lie quite even, you carefully carry your needle from without, inwards to the bottom, and so on from within outwards, using the caution of making the puncture far enough from the edge of the wound, which will not only facilitate the passing the ligature, but will also prevent it from eating through the skin and flesh; this distance may be three or four tenths of an inch: as many more stitches as you shall make, will be only repetitions of the same process. The threads being all passed, you begin tying them in the middle of the wound, though if the lips are held carefully together all the while, as they should be, it will be of no great consequence which is done first. The most useful kind of knot in large wounds, is a single one first; over this, a little linen compress, on which is to be made another single knot, and then a slip-knot, which may be loosened upon any inflammation; but in small wounds there is no danger from the double knot alone, without any compress to tie it upon; and this is most generally practised. If a violent inflammation should succeed, loosening the ligature only will not suffice, it must be cut through and drawn away; and the wound be treated afterwards without any suture. When the wound is small, the less it is disturbed by dressing, the better; but in large ones, there will sometimes be a considerable discharge, and if the threads be not cautiously carried through the bottom of it, abscesses will frequently ensue from the matter being pent up underneath, and not finding issue. If no accident happen, you must, after the lips are firmly agglutinated, take away the ligatures, and dress the orifices which they leave.

It must be remembered, that during the cure, the suture must be always assisted by the application of bandage, if possible, which is frequently of the greatest importance; and that sort of bandage with two heads and a slit in the middle, which is by much the best, will in most cases be found practicable.

The twisted suture being principally employed in the hare-lip, I shall reserve its description for the chapter on that head.

CHAP. II.

OF THE SUTURE OF TENDONS.

WOUNDS of the tendons are not only known to heal again, but even to admit of sewing up like those of the fleshy parts, though they do not re-unite in so short a time. When a tendon is partly divided, it is generally attended with an excessive pain, inflammation, &c. in consequence of the remaining fibres being stretched and forced by the action of the muscle, which necessarily will contract more, when some of its resistance is taken away: to obviate this mischief, it has been hitherto an indisputable maxim in surgery, to cut the tendon quite through, and immediately

diately afterwards perform the ſuture; but I do not think this practice adviſeable, for though the diviſion of the tendon afford preſent eaſe, yet the mere flexion of the joint will have the ſame effect, if, for example, it be a wound of a flexor tendon: beſides, in order to ſew up the extremities of the tendon when divided, we are obliged to put the limb in ſuch a ſituation, that they may be brought into contact, and even to ſuſtain it in that poſture to the finiſhing of the cure; if then, the poſture will lay the tendon in this poſition, we can likewiſe keep it ſo without uſing the ſuture, and more ſure of its not ſlipping away, which ſometimes happens from any careleſs motion of the joint, when the ſtitches have almoſt woren through the lips of the wound; on which account, I would by all means adviſe, in this caſe, to forbear the ſuture, and only to favour the ſituation of the extremities of the tendon, by placing the limb properly.

If it ſhould be ſuggeſted, that, for want of a farther ſeparation, there will not be inflammation enough to produce an adheſion of the ſeveral parts of the wound, which is particularly mentioned as the property of this ſort of cicatrix, though it be likewiſe of all others; I ſay, that the inflammation will be in proportion to the wound, and a ſmall wound is certainly more likely to recover than a large one. If it ſhould be objected, that keeping the limb in one poſture the whole time of the cure, will bring on a contraction of the joint, the objection is as ſtrong againſt the ſuture; and now I am upon this ſubject, I would adviſe ſurgeons to be leſs apprehenſive of contractions after inflammations of the tendons, than practice ſhews they are: for perhaps there is hardly any one rule has done more miſchief than that of guarding againſt this conſequence; and I would lay it down as a method to be purſued at all times, to favour the joint in theſe diſorders, and keep it in that poſture we find moſt eaſy for the patient. The riſque of an immoveable contraction in ſix weeks, is very little, but the endeavour to avoid it has been the loſs of many a limb in half the time.

But when the tendon is quite ſeparated, and the ends are withdrawn from one another, having brought them together with your fingers, you may ſew them with a ſtraight triangular-pointed needle, paſſing it from without inwards, and from within outwards; in ſmall tendons, about three-tenths of an inch from their extremities, and in the tendo Achillis half an inch: I have ſometimes employed two threads in ſewing up the tendo Achillis, and I believe it is generally adviſeable to do ſo, rather than to truſt to a ſingle ſuture.

Some ſurgeons, for fear the muſcle ſhould contract a little notwithſtanding all our care, adviſe not to bring the ends of the tendon into an exact appoſition, but to lay one a little over the other, which allowing for the contraction that always enſues in ſome degree, the tendon will become a ſtraight line, and not be ſhortened in its length. As the wound of the ſkin will be nearly tranſverſe, I would not have it raiſed to expoſe more of the tendon, but rather ſewed up with it, which will conduce to the ſtrength of the ſuture. The knot of the ligature is to be made as in other wounds, and the dreſſings are to be the ſame: there is a ſort of thin crooked needle that cuts on its concave and convex ſides, which is very handy in the ſuture of large tendons, and to be preferred to the ſtraight one. During the cure, the dreſſings muſt be ſuperficial, and the parts kept ſteady with paſteboard and bandage; the ſmall tendons re-unite in three weeks, but the tendo Achillis requires ſix at leaſt, and by violent exerciſe I have known it toren open at the end of ten weeks; though in the inſtance I allude to, I

 brought

brought the lacerated tendons to perfect re-union, without a future.

CHAP. III.

OF THE GASTRORAPHY.

THE account of this operation has engaged the attention of many surgical writers, and occasioned much debate about the proper rules for performing it; and yet what makes the greatest part of the description, can hardly ever happen in practice, and the rest but very seldom. I have been told that Du Verney, who was the most eminent surgeon in the French army a great many years, during the wars and fashion of duelling, declared he never had once an opportunity of practising the gastroraphy, as that operation is generally described; for though the word, in strictness of etymology, signifies no more than sewing up any wound of the belly, yet in common acceptation, it implies that the wound of the belly is complicated with another of the intestine. Now the symptoms laid down for distinguishing when the intestine is wounded, do not with any certainty determine it to be wounded only in one place, which want of information, makes it absurd to open the abdomen in order to come at it; if so, the operation of stitching the bowels can only take place where they fall out of the abdomen, and we can see where the wound is, or how many wounds there are: if it happens that the intestines fall out unwounded, the business of the surgeon is to return them immediately, without waiting for spirituous or emollient fomentations; and in case they puff up so as to prevent their reduction by the same orifice, you may, with a knife or probe-scissars, sufficiently dilate it for that purpose, or even prick them to let out the wind, laying it down for a rule in this, and all operations where the omentum protrudes, to treat it in the method I shall describe in the chapter on the Bubonocele.

Upon the supposition of the intestine being wounded in such a manner as to require the operation (for in small punctures it is not necessary) the method of doing it may be this: taking a straight needle with a small thread, you lay hold of the bowel with your left hand, and sew up the wound by the glover's stitch, that is, by passing the needle through the lips of the wound, from within outwards all the way, so as to leave a length of thread at both ends, which are to hang out of the incision of the abdomen; then carefully making the interrupted suture of the external wound, you pull the bowel by the small thread into contact with the peritonæum, in order to procure an adhesion, and tie them upon a small bolster of linen; though I think it would be more secure to pass the threads with the straight needle through the lower edges of the wound of the abdomen, which would more certainly hold the intestine in that situation. In about six days, it is said, the ligature of the intestine will be loose enough to be cut and drawn away, which must be done without great force; in the interim, the wound is to be treated with superficial dressings, and the patient to be kept very still and low.

CHAP. IV.

OF THE BUBONOCELE.

WHEN the intestine or omentum falls out of the abdomen into any part, the tumour in general is known by the name of *Hernia*, which is farther specified either from the difference of situation, or the nature of its contents. When the intestine or omentum falls through the navel, it is called a *Hernia umbellicalis*, or *Exomphalos*; when through the rings of the abdominal muscles into the groin, *Hernia inguinalis*; or if into the scrotum, *Scrotalis*: these two last, tho' the

the first only is properly so called, are known by the name of *Bubonocele*. When they fall under the ligamentum fallopii, through the same passage that the iliac vessels creep into the thigh, it is called *Hernia femoralis*. The bubonocele is also sometimes accompanied with a descent of the bladder: however, the case is very rare; but when it occurs, it is known by the patient's inability to urine, till the hernia of the bladder is reduced within the pelvis. With regard to the contents characterising the swelling, it is thus distinguished: if the intestine only is fallen, it becomes an *Enterocele*; if the omentum (epiploon) *Epiplocele*; and if both, *Entero-Epiplocele*. There is besides these, another kind of hernia mentioned and described by the moderns, when the intestine or omentum is insinuated between interstices of the muscles, in different parts of the belly. This hernia has derived its name from the place affected, and is called the *Hernia ventralis*; and lastly, there have been a few instances, where the intestines or omentum have have fallen through the great foramen of the ischium into the internal part of the thigh, between and under the anterior heads of the triceps muscle.

All the kinds of hernias of the intestines and omentum, are owing to a preternatural dilatation of the particular orifices through which they pass, and not to a laceration of them, which last opinion (together with a supposed laceration of the peritonæum) has however prevailed so much, as by way of eminence to give name to the disorder, which is known more by that of *rupture*, than by any of those I have here mentioned; on which account I shall beg leave to make use of it myself.

The rupture of the groin, or scrotum, is the most common species of hernia, and in young children is very frequent, but it rarely happens in infancy that any mischiefs arise from it. For the most part, the intestine returns of itself into the cavity of the abdomen whenever the person lies down, at least a small degree of compression will make it. To secure the intestine when returned into its proper place, there are steel-trusses now so artfully made, that, by being accommodated exactly to the part, they perform the office of a bolster, without galling, or even sitting uneasy on the patient. These instruments are of so great service, that were people who are subject to ruptures always to wear them, I believe very few would die of this distemper; since it often appears, upon enquiry, when we perform the operation for the bubonocele, that the necessity of the operation is owing to the neglect of wearing a truss.

In the application of a truss to these kinds of swellings, a great deal of judgement is sometimes necessary, and for want of it we daily see trusses put even on buboes, indurated testicles, hydroceles, &c.; but for the hernias I have described, I shall endeavour to lay down two or three rules, in order to guide more positively to the propriety of applying or forbearing them.

If there is a rupture of the intestine only, it is easily, when returned into the abdomen, supported by an instrument; but if of the omentum, notwithstanding it may be returned, yet I have seldom found the reduction to be of much relief, unless there is only a small quantity of it; for the omentum will lie uneasy in a lump at the bottom of the belly, and, upon removal of the instrument, drop down again immediately; upon which account, seeing the little danger and pain there is in this kind of hernia, I never recommend any thing but a bag-truss, to suspend the scrotum, and prevent, possibly by that means, the increase of the tumour. The difference of these tumours will be distinguished by the feel; that of the omentum feeling flaccid and rumpled, the other more even, flatulent, and springy.

Sometimes, in a rupture of both the intestine and omentum, the gut may be

be reduced, but the omentum will ſtill remain in the ſcrotum; and when thus circumſtanced, moſt ſurgeons adviſe a bag-truſs only, upon a ſuppoſition that the preſſure of a ſteel one, by ſtopping the circulation of the blood in the veſſels of the omentum, would bring on a mortification; but I have learned, from a multitude of thoſe caſes, that if the inſtrument be nicely fitted to the part, it will be a compreſs ſufficient to ſuſtain the bowel, and, at the ſame time, not hard enough to injure the omentum; ſo that, when a great quantity of inteſtine falls down, though it be complicated with the deſcent of the omentum, the rupture will conveniently and ſafely admit of this remedy.

There are ſome ſurgeons, who, to prevent the trouble of wearing a truſs, when the inteſtine is reduced, deſtroy the ſkin over the rings of the abdominal muſcles with a cauſtic, of the ſize of a half-crown piece, and keep their patients in bed till the cure of the wound is finiſhed; propoſing by the ſtricture of the cicatrix to ſupport it in the abdomen for the future; but, by what I have ſeen, the event, tho' often ſucceſsful, is not anſwerable to the pain and confinement; for if, after this operation, the inteſtine ſhould again fall down, which ſometimes happens, there might poſſibly be more danger of a ſtrangulation than before the ſcar was made. This practice ſeems to be more adviſeable on women than men; becauſe in men, the danger of injuring the ſpermatic cord, ſometimes intimidates us from uſing a cauſtic of ſufficient ſtrength to do the proper office.

I have hitherto conſidered the rupture as eaſily moveable; but it happens frequently, that the inteſtine, after it has paſſed the rings of the muſcles, is preſently inflamed, which enlarging the tumour, prevents the return of it into the abdomen, and becoming every moment more and more ſtrangled, it ſoon tends to a mortification, unleſs we dilate the paſſages through which it has fallen, with ſome inſtrument, to make room for its return; which dilatation is the operation for the bubonocele.

It rarely happens that patients ſubmit to this inciſion before the gut is mortified, and it is too late to do ſervice; not but that there are inſtances of people ſurviving ſmall gangrenes, and even perfectly recovering afterwards. I myſelf have been an eye-witneſs of the cure of two patients, who, ſome time after the operation, when the eſchar ſeparated, diſcharged their fæces thro' the wound, and continued to do ſo for a few weeks, in ſmall quantities, when at length the inteſtine adhered to the external wound, and then was fairly healed,

In mortifications of the bowels, when fallen out of the abdomen into the navel, it is not very uncommon for the whole gangrened inteſtine to ſeparate from the ſound one, ſo that the excrement muſt neceſſarily ever after be diſcharged at that orifice: there are likewiſe a few inſtances, where the rupture of the ſcrotum has mortified, and become the anus, the patient doing well in every other reſpect; nay, I have had one inſtance of this nature under my care, in which the excrements were voided totally by the ſcrotum for three weeks or a month, yet by degrees, as the wound healed, they paſſed off chiefly in their natural courſe, and at laſt almoſt wholly ſo. Theſe caſes, however, are only mentioned to furniſh ſurgeons with the knowledge of the poſſibility of ſuch events, and not to miſlead them ſo far as to make favourable inferences with regard to gangrenes of the bowels, which generally are mortal.

Before the performance of the operation for the bubonocele, which is only to be done in the extremity of danger, the milder methods are to be tried; theſe are, ſuch as will conduce to ſoothe the inflammation; for as to the other intent of ſoftening the excrements, I believe it is much to be queſtioned, whether there can be any of that degree of hardneſs as to form the

the obſtruction; and, in fact, thoſe operators who have unluckily wounded the inteſtine, have proved, by the thin diſcharge of the fæces which has followed upon the inciſion, that the induration we feel, is the tenſion of the parts, and not the hardened lumps of excrement.

Perhaps except the pleuriſy, no diſorder is more immediately relieved by plentiful bleeding than this; clyſters repeated, one after another, three or four times (if the firſt or ſecond are either retained too long, or immediately returned) prove very efficacious; theſe are ſerviceable, not only as they empty the great inteſtines of their excrements and flatulences, which laſt are very dangerous, but they likewiſe prove a comfortable fomentation, by paſſing through the colon all around the abdomen. The ſcrotum and groin muſt, during the ſtay of the clyſter, be bathed with warm ſtoops wrung out of a fomentation; and after the part has been well fomented, you muſt attempt to reduce the rupture: for this purpoſe, let your patient be laid on his back, ſo that his buttocks may be conſiderably above his head; the bowels will then retire towards the diaphragm, and give way to thoſe which are to be puſhed in. If, after endeavouring two or three minutes, you do not find ſucceſs, you may ſtill repeat the trial: I have ſometimes, at the end of a quarter of an hour, returned ſuch as I thought deſperate, and which did not ſeem to give way in the leaſt, till the moment they went up; however, this muſt be practiſed with caution, for much rough handling will be pernicious.

If, notwithſtanding theſe means, the patient continues in very great torture, though not ſo bad as to threaten an immediate mortificaton, we muſt apply ſome ſort of pultice to the ſcrotum. That which I uſe in this caſe, is equal parts of oil and vinegar, made into a proper conſiſtence with oatmeal: after ſome few hours the fomentation is to be repeated, and the other directions put in practice; and if theſe do not ſucceed, I am inclined to think it adviſeable to prick the ineſtine in five or ſix places with a needle, as recommended by Peter Lowe, an old Engliſh writer, who ſays, he has often experienced the good effects of this method in the inguinal hernia, when all other means have failed.

After all, ſhould the pain and tenſeneſs of the part continue, and hiccughs and vomitings of the excrements ſucceed, the operation muſt take place; for if you wait till a languid pulſe, cold ſweats, ſubſiding of the tumour, and emphyſematous feel come on, it will be moſt likely too late, as they are pretty ſure ſymptoms of a mortification.

To conceive rightly of the occurrences in this operation, it muſt be remembered, that in every ſpecies of rupture, a portion of the peritonæum generally falls down with whatever makes the hernia; which from the circumſtance of containing immediately the contents of the tumour, is called the *Sac* of the hernia. Now, the portion of the peritonæum, which uſually yields to the impulſion of the deſcending viſcera, is that which correſponds with the inmoſt opening of the abdominal muſcles, juſt where the membrana cellularis peritonæi begins to form the tunica vaginalis of the ſpermatic cord, ſo that the ſac with the viſcera inſinuate themſelves into the tunica vaginalis of the ſpermatic cord, and lie upon the tunica vaginalis of the teſticle: nevertheleſs, upon examination, I have alſo frequently found the contents of the hernia in contact with the teſticle itſelf, that is to ſay, within the tunica vaginalis of the teſticle; which I confeſs has ſurpriſed me, as one would imagine that it could not have been effected, but by burſting through the peritonæum. But a late diſcovery has offered an eaſy ſolution of this appearance; which is now eſtabliſhed as a fact, though eſteemed a few years ſince as incredible. It appears, by this

this discovery, that for some months during gestation, the testes of the fœtus remain in the abdomen, and when they descend into the tunica vaginalis, there is an immediate communication betwixt the cavity of the abdomen, and the cavity of the tunica vaginalis, which, in process of time, becomes obliterated by the coalition of the tunic with the cord; but if it happen, before the coalition be effected, that the intestine or the omentum fall into the scrotum, they will necessarily remain in contact with the testes: and in this manner, what we esteemed so extraordinary a phenomenon, is readily accounted for.

From this description of the descent of the viscera, it is evident that the herniary sac is contained within the tunica vaginalis, and ought to give the idea of one bag inclosing another; but in the operation, this distinction of coats does not always appear; for the herniary sac sometimes adheres so firmly to the tunica vaginalis, that together they make but one thick coat. This adhesion may possibly result from the present inflammation of the parts, which has rendered the operation necessary; but I am inclined to believe, that the herniary sac adheres in all bubonoceles which are not very recent, and that, when we restore the hernia into the abdomen, and support it by a truss, it is only the viscera, and not the herniary sac, which is reduced; at least I have found this to be the case in several that I have dissected.

The best way of laying your patient will be on a table about three feet four inches high, letting his legs hang down; then properly securing him, you begin your incision above the rings of the muscles, beyond the extremity of the tumour, and bring it down about half the length of the scrotum. through the membrana adiposa, which will require very little trouble to separate from the tunica vaginalis, and consequently, will expose the rupture for the farther processes of the operation; but I cannot help once more recommending it as a thing of great consequence, to begin the external incision high enough above the rings, since there is no danger in that part of the wound: and for want of the room this incision allows, the most expert operators are sometimes tedious in making the dilatation. If a large vessel is opened by the incision, it must be taken up before you proceed farther.

When the tunica vaginalis is laid bare, you must cut carefully through it and the peritonæum, in order to avoid pricking the intestines; though, to say the truth, there is not quite so much danger of this accident as is represented; for sometimes the quantity of water separated in the sac of the peritonæum, raises it from the intestine, and prevents any farther mischief.

It has been considered by some as an improvement in the operation, where the disorder is recent, to forbear wounding the peritonæum, and to return the sac entire into the abdomen, thinking, by this means, to make a firmer cicatrix, and more surely to prevent a relapse for the future; but besides that it is often impracticable by reason of its adhesion, the seeming necessity there is of letting out the waters that are frequently fœtid, of taking out any part of the omentum that may possibly be mortified, and which we cannot come at without the incision, and lastly of leaving an opening for the issue of the excrements out of the wound, in case an eschar should drop from the intestine (all which accidents happen sometimes very early) put out of dispute, in my opinion, the impropriety of this method.

The peritonæum being cut through, we arrive to its contents, the nature of which will determine the next process: for if it is intestine only, it must directly be reduced; but if there is any mortified omentum, it must be cut off; in order to which it is advised to make a ligature above the part wounded, to prevent an hæmorrhage; but

but it is quite needless, and in some measure, pernicious, as it puckers up the intestine, and disorders its situation, if made close to it: for my part, I am very jealous that wounds of the omentum are dangerous, on which account I cannot pass over this process of the operation, without cautioning against cutting any of it away, unless it is certainly gangrened; and when that happens, I think it advisable to cut off the mortified part with a pair of scissars, near to the sound part, leaving a small portion of it to separate in the abdomen; which may be done with as much safety as to leave the same quantity below a ligature.

When the omentum is removed, we next dilate the wound; to do which with safety, an infinite number of instruments have been invented; but in my opinion, there is none we can use in this case with so good management as a knife; and I have found my finger in the operation a much better defence against pricking the bowels, than a director which I intended to employ: the knife must be a little crooked, and blunt at its extremity, like the end of a probe. Some surgeons, perhaps, may not be steady enough to cut dexterously with a knife, and may therefore perform the incision with probe-scissars, carefully introducing one blade between the intestine and circumference of the rings, and dilating upwards, and a little obliquely outwards. When the finger and knife only are employed, the manner of doing the operation will be by pressing the gut down with the fore-finger, and carrying the knife between it and the muscles, so as to dilate upwards about an inch, which will be a wound generally large enough; but if, upon examination, it shall appear that the intestine is strangulated within the abdomen, which may possibly happen from a contraction of the peritonæum near the enterance into the sac; in that case the incision must be continued through the length of the contracted channel, or the consequence will be fatal, notwithstanding the intestine be restored into the scrotum: on this account the operator should pass his finger up the sac into the abdomen, after the reduction of the gut, in order to discover whether it be safely returned into its proper place.

The opening being made, the intestine is gradually to be pushed into the abdomen, and the wound to be stitched up; for this purpose some advise the quilled, and others the interrupted suture, to be passed through the skin and muscles; but as there is not so much danger of the bowels falling out when a dressing and bandage are applied, and the patient all the while kept upon his back, but that it may be prevented by one or two slight stitches through the skin only, I think it by all means adviseable to follow this method, since the stricture of a ligature in these tendinous parts may be dangerous.

Hitherto, in the description of the bubonocele, I have supposed the contents to be loose, or separate in the sac; but it happens sometimes in an operation, that we find not only an adhesion of the outside of the peritonæum to the tunica vaginalis, and spermatic vessels, but likewise of some part of the intestines to its internal surface; and in this case there is so much confusion, that the operator is often obliged to extirpate the testicle, in order to dissect away and disentangle the gut, though if it can be done without castration it ought. I believe, however, this accident happens rarely, except in those ruptures that have been a long time in the scrotum without returning: in which case the difficulty and hazard of the operation are so great, that unless urged by the symptoms of an inflamed intestine, I would not have it undertaken. I have known two instances of persons so uneasy under the circumstance of such a load in their scrotum, though not otherwise in pain, as to desire the operation; but the

the event in both proved fatal; which I think ſhould make us cautious how we expoſe a life for the ſake of convenience only, and teach our patients to content themſelves with a bag-truſs when in this condition.

The dreſſing of the wound firſt of all may be with dry lint, and afterwards as directed in the Introduction.

The operation of the bubonocele in women ſo nearly reſembles that performed on men, that it requires no particular deſcription, only in them the rupture is formed by the inteſtine or omentum falling down through the paſſage of the ligamentum rotundum into the groin, or one of the labia pudendi; where cauſing the ſame ſymptoms as when obſtructed in the ſcrotum, it is to be returned by the dilatation of that paſſage.

CHAP. V.

OF THE EPIPLOCELE.

THERE have been a few inſtances where ſo great a quantity of the omentum has fallen into the ſcrotum, that by drawing the ſtomach and bowels downwards, it has excited vomitings, and the ſame train of ſymptoms as happen in a bubonocele, in which caſe the operation of opening the ſcrotum is neceſſary: the inciſion muſt be made in the manner of that for the rupture of the inteſtine, and the ſame rules obſerved with regard to the omentum, that are laid down in the laſt chapter. It is neceſſary alſo, the rings of the muſcles ſhould be dilated, or otherwiſe, though you have taken away ſome of the mortified part of the omentum, the reſt that is out of its place, and ſtrangled in the perforation, will gangrene alſo. The wound is to be treated in the ſame manner as that after the operation of the bubonocele. What I have here deſcribed as an inducement to the operation, ſhould, by the experience I have had, be the only one. There are a great many people, who are ſo uneaſy with ruptures, though they are not painful, that a little encouragement from ſurgeons of character will make them ſubmit to any means of cure; but as I have ſeen two or three patients, who were in every reſpect hale and ſtrong, die a few days after the operation, the event, though very ſurpriſing, ſhould be a leſſon, never to recommend this method of treating an epiplocele, unleſs it is attended with inflammation, &c.

CHAP. VI.

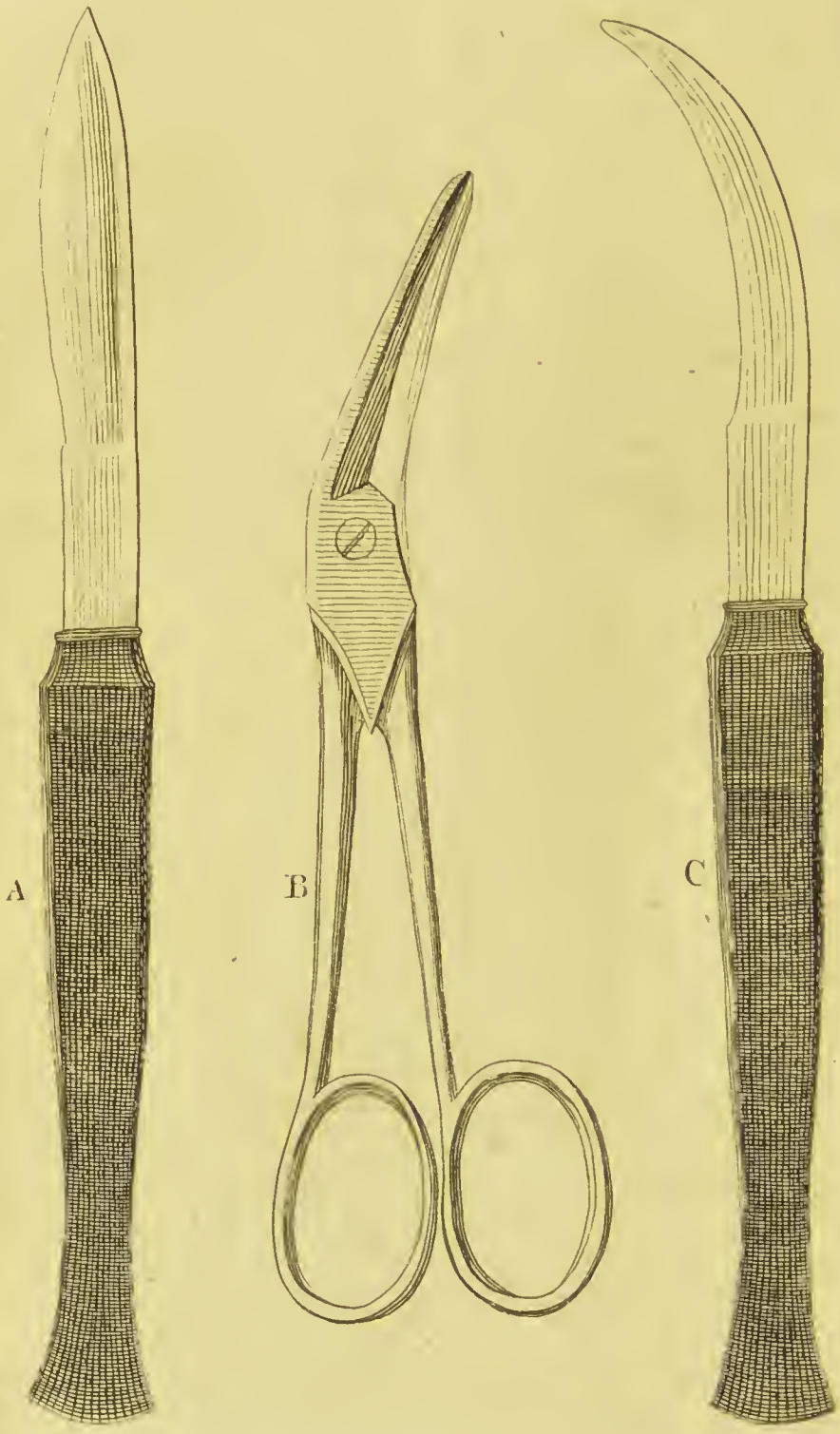
OF THE HERNIA FEMORALIS.

THIS ſpecies of rupture is the ſame in both ſexes, and formed by the falling of the omentum or inteſtine, or both of them, into the inſide of the thigh, through the arch made by the os pubis, and ligamentum fallopii, where the iliac veſſels and tendons of the pſoas and illiacus internus muſcles paſs from the abdomen. It is very neceſſary ſurgeons ſhould be aware of the frequency of this diſorder, which creates the ſame ſymptoms as other ruptures, and muſt firſt of all be treated by the ſame methods: the manner of operating in the reduction, is here too ſo exactly the ſame, with the difference of dilating the ligament inſtead of the rings of the muſcles, that it would be a mere repetition of the operation for the bubonocele to give any deſcription of it; only it may be obſerved, that the ſpermatic cord, as it enters into the abdomen, lies nearly tranſverſe to the inciſion, and cloſe in contact with the ligament, ſo that, unleſs you make the dilatation obliquely outwards, inſtead of perpendicularly upwards, you will probably divide thoſe veſſels.

CHAP. VII.

OF THE EXOMPHALOS.

THIS rupture is owing to a protruſion of the inteſtine, or omentum, or both of them, at the navel, and rarely


A
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rarely happens to be the ſubject of an operation; for though the caſe is common, yet moſt of them are gradually formed from very ſmall beginnings, and if they do not return into the abdomen upon lying down, in all probability they adhere without any great inconvenience to the patient, till ſome time or other an inflammation falls upon the inteſtines, which ſoon brings on a mortification, and death; unleſs, by great chance, the mortified part ſeparates from the ſound one, leaving its extremity to perform the office of an anus. In this emergency, however, I think it adviſeable to attempt the reduction, if called in at the beginning, though the univerſal adheſion of the ſac and its contents, are a great obſtacle to the ſucceſs. The inſtance in which it is moſt likely to anſwer, is, when the rupture is owing to any ſtrain, or ſudden jerk, and is attended with thoſe diſorders which follow upon the ſtrangulation of a gut.

In this caſe, having tried all other means in vain, the operation is abſolutely neceſſary; which may be thus performed:—Make the inciſion ſomewhat above the tumour, on the left ſide of the navel, through the membrana adipoſa; and then emptying the ſac of its water, or mortified omentum, dilate the ring with the ſame crooked knife, conducted on your finger, as in the operation for the bubonocele; after this, return the inteſtines and omentum into the abdomen, and dreſs the wound without making any ligature but of the ſkin only.

CHAP. VIII.

OF THE HERNIA VENTRALIS

THE hernia ventralis which ſometimes appears between the recti muſcles is very large; but that tumour which requires the operation, is ſeldom bigger than a walnut, and is a diſeaſe not ſo common as to have been obſerved by many; but there are caſes enough known to put a ſurgeon upon enquiry after it, when the patient is ſuddenly taken with all the ſymptoms of a rupture, without any appearance of one in the navel, ſcrotum, or thigh. I have before defined this hernia to be a ſtrangulation of the gut, in ſome of the interſtices of the muſcles of the abdomen. The manner of dilating it will be the ſame as that before directed in the other hernias. After the operation in this, and all hernias where the inteſtines have been reduced, it will be convenient to wear a truſs, ſince the cicatrix is not always firm enough in any of them to prevent a relapſe.

PLATE II.

THE EXPLANATION.

A. The round-edged knife, of a convenient ſize for almoſt all operations where a knife is uſed. The make of it will be better underſtood by the figure than any other deſcription; only it may be remarked, that the handle is made of a light wood, as indeed the handles of all inſtruments ſhould be, that the reſiſtance to the blades may be better felt by the ſurgeon.

B. A pair of probe-ſciſſars, which require nothing particular in their form, but that the lower blade ſhould be made as ſmall as poſſible, ſo that it is ſtrong and has a good edge; becauſe, being chiefly uſed in ſiſtulas in *ano*, the introduction of a thick blade into the ſinus, which is generally narrow, would be very painful to the patient.

C. The crooked knife, with the point blunted, uſed in the operation of the bubonocele.

CHAP. IX.

OF THE HYDROCELE.

THE Hydrocele, called alſo *Hernia Aquoſa*, *Hydrops Scroti*, and *Hydrops Teſtis*, is a watery tumour of

of the ſcrotum; which, notwithſtanding the multiplicity of diſtinctions uſed by writers, is but of two kinds; the one, when the water is contained in the tunica vaginalis, and the other, when in the membrana cellularis ſcroti; this laſt is almoſt always complicated with an anaſarca, which ſpecies of dropſy is an extravaſation of the water lodged in the cells of the membrana adipoſa; and when thus circumſtanced, will not be difficult to be diſtinguiſhed; beſides that, it is ſufficiently characteriſed by the ſhining and ſoftneſs of the ſkin, which gives way to the leaſt impreſſion, and remains pitted for ſome time. The penis is likewiſe ſometimes enormouſly enlarged, by the inſinuation of the fluids into the membrana cellularis, all which ſymptoms are abſolutely wanting in the dropſy of the tunica vaginalis.

In the dropſy of the membrana cellularis ſcroti, the puncture with the trocar is recommended by ſome, and little orifices made here and there with the point of a lancet, by others; or a ſmall ſkane of ſilk paſſed by a needle through the ſkin, and out again at the diſtance of two or three inches, to be kept in the manner of a ſeton till the waters are quite drained; but the two firſt methods avail very little, as they open but two cells; and the laſt cannot be ſo efficacious in that reſpect as inciſions, and will be much more apt to become troubleſome, and even to gangrene.

Indeed it is not often proper to perform any operation at all upon this part, ſince the membrana cellularis ſcroti, being a continuation of the membrana adipoſa, ſcarifications made through the ſkin in the ſmall of the legs, will effectually empty the ſcrotum, as I have many times experienced; and this place ought rather to be pitched upon than the other, as being more likely to anſwer the purpoſe, by reaſon of its dependency: however, it ſometimes happens that the waters fall in ſo great quantities into the ſcrotum, as, by diſtending it, to occaſion great pain, and threaten a mortification: the prepuce of the penis alſo becomes very often exceſſively dilated, and ſo twiſted, that the patient cannot void his urine. In theſe two inſtances, I would propoſe an inciſion of three inches long, to be made on each ſide of the ſcrotum, quite through the ſkin into the cells containing the water, and two or three of half an inch long, in any part of the penis, with a lancet or knife; all which may be done with great ſafety, and ſometimes with the ſucceſs of carrying off the diſeaſe of the whole body. This I can poſitively ſay, that though I have done it upon perſons of a very languid condition, yet, by making the wound with a ſharp inſtrument, and treating it afterwards with fomentations and ſoft digeſtives, I have rarely ſeen any inſtance of a gangrene, which is generally ſo much apprehended in this caſe.

The dropſy of the tunica vaginalis, is owing to a preternatural diſcharge of that water which is continually ſeparating in a ſmall quantity on the internal ſurface of the tunic, for the moiſtening or lubricating the teſtiele, and which, collecting too faſt, accumulates and forms, in time, a ſwelling of great magnitude: this is what I take to be the other ſpecies of hydrocele, and the only one beſides; though from the time of Celſus, down to our own days, the writers on this ſubject make two kinds; one on the inſide of the tunica vaginalis, and another between the ſcrotum and outſide of it; and among the cauſes aſſigned for this diſtemper, the principal one is the derivation of water from the aſcites, which opinion, though univerſally received, is abſurd in anatomy: for beſides that people afflicted with a hydrocele, are very ſeldom otherwiſe dropſical; and on the contrary, thoſe with an aſcites have no hydrocele; the tunica vaginalis is like a purſe totally ſhut up on the outſide of the abdomen, ſo that no water from any

part

part can insinuate into it; and with respect to the notion of water falling from the abdomen into the tunica vaginalis and scrotum, it is equally impossible; for though in the hernia intestinalis the gut falls into this part, yet in that case the peritonæum (which would hinder the egress of the water) falls down too, which the ancients did not know, and the moderns have omitted to reflect on, in relation to this subject: it is true, that where the ascites is complicated with a hernia intestinalis, or where there has been a previous hernia of the scrotum, and the sac of the peritonæum remains within the scrotum, the water of the ascites, in that case, may fall into the sac of the peritonæum, and in that manner form a tumour of the scrotum; but this is not properly a dropsy of the tunica vaginalis. It must be here understood, that when I say there is no communication between the cavity of the abdomen, and the cavity of the tunica vaginalis, I speak of adults; for in the fœtus, and even in an infant state, there is a communication; and in those few instances, where the communication is preserved to adultness, the water of an ascites may fall into the tunica vaginalis; but this happens so rarely, that it should not be considered as an impeachment of the preceding doctrine.

The hydrocele of the tunica vaginalis, is very easily to be distinguished from the hydrocele of the membrana cellularis, by the preceding description of that species of dropsy. I shall now explain how it differs from the other tumours of the scrotum, viz. the bubonocele, epiplocele, and enlarged testicle. In the first place, it is seldom or never attended with pain in the beginning, and is very rarely to be imputed to any accident, as the hernias of the omentum and intestine are; from the time it first makes its appearance, it very seldom is known to disappear or diminish, but generally continues to increase, though in some much faster than in others; in one person growing to a very painful distention in a few months, whilst in another, it shall not be troublesome in many years; nay, shall cease to swell at a certain period, and ever after continue in that state without any notable disadvantage, though this last case very rarely happens: in proportion as it enlarges, it becomes more tense, and then is said to be transparent; indeed the transparency is made the chief criterion of the distemper, it being constantly advised to hold a candle on one side of the scrotum, which, it is said, will shine through to the other, if there be water: but this experiment does not always answer, because sometimes the tunica vaginalis is very much thickened, and sometimes the water itself is not transparent; so that to judge positively if there be a fluid, we must be guided by feeling a fluctuation: and though we do not perhaps evidently perceive it, yet we may be persuaded there is a fluid of some kind, if we were once assured that the distension of the tunica vaginalis makes the tumour, which is to be distinguished in the following manner:—

If the intestine, or omentum, form the swelling, they will be soft and pliable (unless inflamed) uneven in their surface, particularly the omentum, and both of them extend themselves up from the scrotum quite into the very abdomen; whereas in the hydrocele the tumour is tense and smooth, and ceases before, or at its arrival to, the rings of the abdominal muscles; because the upper extremity of the tunica vaginalis, terminates at some distance from the surface of the belly.

When the testicle is increased in its size, the tumour is rounder, and if not attended with an enlargement of the spermatic vessels, the cord may be easily distinguished between the swelling and abdomen; but without this rule of distinction, either the pain, or the very great hardness, will discover it to be a disease of the testicle.

As to the cure of this diſtemper by external applications, or internal means, after having tried upon a great variety of ſubjects, moſt of the medicines invented to that end, I have found but very little ſatisfaction in the event; for if by chance any one has mended under a phyſical regimen, it muſt be confeſſed too, that there are ſome inſtances of people recovering, who have ſo abſolutely neglected themſelves as not even to wear a bag-truſs; on which account I ſhould judge it adviſeable to wait with patience till the tumour becomes troubleſome, and then to tap it with a lancet or trocar. In opening with a lancet, it may poſſibly happen the orifice of the ſkin ſhall ſlip away from that of the tunic, and prevent the egreſs of the water; to obviate which inconvenience, you may introduce a probe, and by that means ſecure the exact ſituation of the wound; but if the coats are very much thickened, it will be adviſeable to uſe the trocar rather than the lancet. It is ſpoken of as an eaſy thing to hold the teſticle with the left hand, while we make the puncture with the right; but when the tunica vaginalis is very tenſe, it cannot well be diſtinguiſhed: however, I think there is no danger of wounding it, if you make the puncture in the inferior part of the ſcrotum. During the evacuation, the ſcrotum muſt be regularly preſſed; and after the operation, a little piece of dry lint and ſticking-plaſter are ſufficient.

This method of tapping, is called the palliative cure; not but that it does now and then prove an abſolute one. To prevent the relapſe of this diſeaſe, ſurgeons preſcribe the making a large wound, either by inciſion or cauſtic, and upon healing it afterwards, the firmneſs and contraction of the cicatrix may bind up the relaxed lymphatic veſſels, and obſtruct the farther preternatural effuſion of their contents: but by what I have ſeen of this practice, it is generally attended with ſo much trouble, that notwithſtanding its ſucceſs in the end, I believe whoever reads the following caſes, will be apt to diſcard the method, and abide rather by the palliative cure.

CASE I.

A. B. aged 44, a ſtrong man, never in his life having been ſubject to any other infirmity, put himſelf under my care for the relief of a hydrocele on the left ſide of the ſcrotum.

December 3, 1733, I diſcharged the water, by making an inciſion through the teguments about four inches long. Towards night he grew feveriſh, got no reſt, the ſcrotum and teſticle on that ſide beginning to inflame, and the capillary arteries (dilating) to bleed freely. He was ſeized too with a violent pain in the back, which was in a great meaſure removed by ſuſpending the ſcrotum with a bag-truſs.

From the 3d to the 7th, continued in a moſt dangerous condition, when the fever tended to a criſis, by the ſuppuration of both wound and teſticle.

From the 7th to the 24th, he daily acquired ſtrength; but the diſcharge from the teſticle increaſing, and the ſinus penetrating now very deep towards the ſeptum ſcroti, I opened the body of the teſticle the whole length of the abſceſs.

From the 24th, the diſcharge leſſened ſurpriſingly; ſo that in ſix days the ſurface of the greateſt part of the teſticle united with the ſcrotum, and there remained only a ſuperficial wound, which was entirely cicatriſed on Jan. 10, 1733-4.

March 31, 1737, he continued in perfect health.

CASE II.

In the year 1733, I made an inciſion through the ſcrotum and tunica vaginalis

ginalis of a boy about eight years of age, who narrowly escaped with his life: but the symptomatic fever terminating at last in an abscess of the scrotum, it proved his cure, though with some trouble, in a few weeks.

CASE III.

A. C. aged 37, of a very hale habit of body, had complained of a tumour on one side of the scrotum, which continuing to enlarge for six years, he applied to a surgeon, who laid a small caustic on the upper part of it, and opening the eschar, emptied near three pints of water; but he relapsing soon after this, I undertook the absolute cure.

December 15, 1736, I laid on the anterior and upper part of the scrotum, a caustic about six inches long, and one broad.

December 16, by a small puncture through the eschar, I emptied above a quart of water.

From the 17th to the 24th, he continued in a great deal of pain, not only in the part, but in his back and loins, and had very little rest; the scrotum on that side became exceedingly inflamed, and thickened, the symptomatic fever running very high, without any signs of the digestion of the wound.

On the 24th at night he grew a little easier, and continued so till the 29th, when the slough separated; but the wound retained still a bad aspect, no granulations appearing on its surface.

From December 29, to January 5, he remained in the same state.

From the 5th to the 13th, the swelling and pain rather increased, and that night he was seized with an ague-fit, which returned every other day twice more.

From the 17th to the 26th, the ague being stopped, he began to alter much for the better, two imposthumations on the scrotum being in this interim opened.

By February 1, the pain was quite gone, the tumour very much sunk, and the induration softened.

In a very few days after, the wound cicatrized; and on Feb. 24, I left him in perfect health, and free from any complaint.

Having in the preceding cases been seemingly threatened with the death of the patients, I tried the following experiment, upon the reputation of its having been done with success by others.

CASE IV.

A. D. aged forty-two, had for near four years been troubled with a hydrocele on one side, for which I had tapped him about twelve times, taking away near a pint of clear water each operation.

January 3, 1736-7, after having emptied the tunica vaginalis, I injected an ounce of spirit of wine; in the instant, he complained of great pain, which continued to increase, and the next day the teguments were very much augmented in their bulk and thickness.

January 7. The tension became violently painful, and perceiving a fluctuation, I made a puncture, by which he voided about half a pint of water, very deeply tinged with blood, but without any flavour of the spirits to be distinguished by the smell: this gave him some ease, but the inflammation and thickness continued a whole month, and then terminated in two abscesses on the forepart of the scrotum, which I opened the 7th of February following; and on their discharge, the whole tumour subsided, leaving a firm cicatrix and absolute cure of that disorder.

Something similar to *A. D.*'s bloody water, is the case of another person who was under my care: he had at considerable intervals of time been often tapped, discharging that sort of serous water the tunica vaginalis for the most part yields; at last it became tinged with blood, and every time grew more bloody than the other: the fourth discharge of this kind, was attended with a remarkable hæ-

hæmorrhage, and terminated in an absolute cure; no signs of a relapse appearing some months after, as I had an opportunity to inform myself.

To the cases above recited, I could add still more that have fallen within my knowledge, since the time I made these observations; particularly two, attended with inflammation and abscess, from the mere puncture of the lancet: both of which terminated in an absolute cure. It may be remarked however of these two, that one was attended with a thickened tunic, and the water bloody; and in the other, the coat was thickened, and the epididymis enlarged and indurated from a former gonorrhœa.

I would not however be understood, from this catalogue of misfortunes, that the operation is never performed without much trouble; some examples I have known in its favour, but by no means enough to warrant the recommendation of it, unless to such patients who are inconsoleable under the distemper, and are willing to sustain any thing for a cure.

It is worth observing, that upon examination of the several hydroceles, it appeared evidently, their cure was wrought by an universal adhesion of the testicle to the tunica vaginalis, and again of that coat to the parts enveloping it; from which observation it will not be difficult to conceive how it happens, that discharges of bloody water work a cure; since inflammations of membranes almost perpetually produce adhesions of the neighbouring parts, and these discharges are no other than a mixture of blood with the water from the ruptured vessels of the inflamed tunic.

It has been suggested, that probably the exposing the tunica vaginalis to the air, might occasion the above-mentioned disorders; but besides that the case of the injected sp. vin. the case of the caustic, and the two punctures, are sufficient answers to that opinion, the instances I have seen of the whole scrotum separating in a gangrene from the tunica vaginalis, and leaving it naked a great many days without any ill effect, put it out of dispute, that it is the mere inflammation of the tunic produces the danger. I have castrated several men, whose schirrhous testicles were accompanied with a hydrocele, but the whole tunica vaginalis being carried off by the operation, they all recovered without any bad symptoms. I have here proposed an incision only through the tunica vaginalis, as the means to effect a radical cure; but it has been said, that to cut off a large portion of it, is a more effectual and a less dangerous operation; this fact I have lately taken under consideration, but have not yet had sufficient experience to form a positive opinion on the subject.

I shall finish this chapter with a farther remark on the supposed variety of hydroceles. Besides the imaginary one already specified between the scrotum and inferior membranes, there is mention made of a species of dropsy between the cremaster muscle and tunica vaginalis: but I judge it more likely to be within side the tunica vaginalis of the cord, which adhering in different places to the spermatic vessels, may form a cyst or two between the adhesions, of which an instance has fallen under my own examination. Indeed, if we reflect on the cause of a dropsy of this part, we must necessarily confine it to the inside of the membrane, where only is that order of vessels which are the subject of the disease. The dropsy of the testis itself, is the last supposed species, but it is what I have never seen; and from the analogy of the testis, to the structure of other glands, that are not pretended to become dropsical, I am suspicious there is no such distemper.

CHAP. X.

OF CASTRATION.

THIS is one of the most melancholy operations in the practice of surgery, since it seldom takes place

place but in disorders into which the patient is very apt to relapse, viz. those of a schirrhus, or cancer; for under most of the symptoms described as rendering it necessary, it is absolutely improper; such as a hydrocele, abscess of the testis, an increasing mortification, or what is sometimes understood by a sarcocele; of which last it may not be amiss to say a word. In the utmost latitude of the meaning of this term, it is received as a fleshy swelling of the testicle itself, called likewise hernia carnosa; or in some enlargements, such as in a clap, more frequently hernia humoralis; but generally speaking, is considered as a fleshy excrescence formed on the body of the testis, which becoming exceedingly hard and tumefied, for the most part is supposed to demand extirpation, either by cutting or burning away the induration, or amputating the testicle: but this maxim too precipitately received, has, I apprehend, very much misguided the practitioners of surgery.

In order to conceive better of the distinction I am going to make, it must be remembered, that what is called the testicle, is really composed of two different parts, one glandular, which is the body of the testis itself; and one vascular or membranous, known by the name of *epididymis*, which is the beginning of the vas deferens, or the collection of the excretory ducts of the gland.

Now it sometimes happens that this part is tumefied, independent of the testicle; and feeling like a large adventitious excrescence, answers very well to the idea most surgeons form of a sarcocele; but not being aware of the different nature and texture of the epididymis, they have frequently confounded its disorders with those of the testicle itself, and equally recommended extirpation in the induration of one or the other. But without tiring the reader with particular histories of cases relating to this subject, I shall only say, that from diligent enquiry I have collected, that all indurations of the glandular part of the testicle not tending to inflammation and abscess, generally, if not always, lead on to schirrhus and cancer; whereas, those of the epididymis seldom or never do. It is true, in spite of internal or external means, these last often retain their hardness, and sometimes suppurate, but, however, without much danger in either case.

It will not be hard to account for this difference of consequences, from tumours of seemingly one and the same body, when we reflect how much it is the nature of cancerous poisons to fix upon glands, and how different the epididymis is from a gland, though so nearly in the neighbourhood of one.

I would not have it supposed from what I have said, that the epididymis never becomes cancerous; I confess it may, so may every part of the human body: but I advance, that it rarely or never is so, but from an affection of the glandular part of the testicle first, which indeed seldom fails to taint, and by degrees to confound it in such a manner, as to make one mass of the two.

Before we castrate, it is laid down as a rule to enquire whether the patient has any pain in his back, and in that case to reject the operation, upon the reasonable presumption of the spermatic vessels being likewise diseased: but we are not to be too hasty in this determination; for the mere weight of the tumour stretching the cord, will sometimes create the complaint. To learn the cause then of this pain in the back, when the spermatic cord is not thickened, let your patient be kept in bed, and suspend his scrotum, in a bag-truss, which will relieve him, if disordered by the weight only; but if the spermatic cord is thickened or indurated, which disease, when attended with a dilatation of the vessels of the scrotum, is known by the Greek appellations *circocele* and *varicocele*, the case is desperate and not to be undertaken.

But supposing no obstacle in the way to the operation, the method of doing it may be this:—Lay your patient on a square table of about three feet four inches high, letting his legs hang down, which, as well as the rest of the body, must be held firm by the assistants. Then, with a knife, begin your wound above the rings of the abdominal muscles, that you may have room afterwards to tie the vessels, since, for want of this caution, operators will necessarily be embarrassed in making the ligature; then carrying it through the membrana adiposa, it must be continued downward, the length of it being in proportion to the size of the testicle. If it is very small, it may be dissected away without taking any part of the scrotum; but I am not very fond of this method, because so much loose flabby skin is apt to form abscesses afterwards, and very frequently grow callous. If the testicle, for instance, weighs twenty ounces, having made one incision about five inches long, a little circularly, begin a second in the same point as the first, bringing it with an opposite sweep, to meet the other in the inferior part, in such a manner as to cut out the shape of an oval, whose smallest diameter will be two inches. After this, dissect away the body of the tumour with the piece of skin on it from the scrotum, first taking up some of the blood-vessels, if the hæmorrhage is dangerous. Then pass a ligature round the cord, pretty near the abdomen; and if you have space between the ligature and testicle, a second about half an inch lower, to make the stoppage of blood still more secure. The ligatures may be tied with what is called the surgeon's knot, where the thread is passed through the ring twice. This done, cut off the testicle a little underneath the second ligature, and pass a needle from the skin at the lower part of the wound through the skin at the upper part, in such manner as to envelope in some degree the sound testicle, which will greatly facilitate and quicken the cure; or, if one stitch will not answer the purpose, you may repeat it in such part of the wound, where the skin on each side lies most loose.

The method I have here described is what I have most frequently practised; but I think I have of late years performed the operation with more dexterity, where I have divided the testicle from the cord, before I had dissected away the skin from the body of the testicle; for having had by this means an opportunity of laying hold of its upper part, I could separate it from the scrotum with much more ease than without that advantage.

I once castrated a man whose testicle weighed above three pounds, where some of the vessels were so exceedingly varicous and dilated, as nearly to equal the size of the humeral artery; however, I took up two or three of the most considerable, and pursued the operation, cutting away near three-fourths of the skin, by which means I avoided a dangerous effusion, as by dividing the vessels before they were much ramefied, I had fewer ligatures to make. The success answered the design, and the patient survived the operation and healing of the wound; but the cancerous humour falling on his liver some time after, destroyed him.

In large tumours, such as the last I have mentioned, it is adviseable to cut away great part of the skin; for besides that the hæmorrhage will be much less in this case, and the operation greatly shortened, the skin, by the great distension having been rendered very thin, will, great part of it, if not taken away, sphacelate, and the rest be more prone to degenerate into a cancerous ulcer.

It may be observed, I do not, in order to avoid wounding the spermatic vessels, recommend pinching up the skin before the incision, and afterwards thrusting the fingers between the membrana cellularis and the testicle, to tear the one from the other; the

the first is not dextrous; and the other is painful; and both of them, in my opinion, are calculated to prevent what there is little or no danger of.

CHAP. XI.

OF THE PHYMOSIS.

THE phymosis signifies no more than such a straightness of the prepuce, that the glans cannot be denuded; which, if it becomes troublesome so as to prevent the egress of the urine, or conceal under it chancres of foul ulcers, quite out of the reach of application, is to be cut open. It sometimes happens that children are born imperforate; in which case, a small puncture, dressed afterwards with a tent, effects a cure; but this operation is chiefly practised in venereal cases, in order to expose chancres, either on the glans, or within-side the prepuce itself: and here, if the prepuce is not very callous and thick, a mere incision will answer; which may be made either with the scissars, or by slipping a knife between the skin and glans to the very extremity, and cutting it up. The last method is more easy than that of the scissars, but it is safer to make the wound on one side of the prepuce than upon the upper part, for I have sometimes seen the great vessels on the dorsum penis afford a terrible hæmorrhage, which may be avoided by following this rule; though the prepuce remains better shaped after an incision made in the upper part, and therefore is to be preferred by those who understand how to take up the vessels.—In children it sometimes happens that the prepuce becomes very much contracted; and in that case, it is accidentally subject to slight inflammations, which bring on some symptoms of the stone; but the disorder is always removed by the cure of the phymosis.

If the prepuce be very large and indurated, the opening alone will not suffice, and it is more adviseable to take away the callosity by circumcision, which must be performed with a knife; and if the artery bleed much, it must be taken up with a small needle and ligature. It may be worth remarking here, that in certain phymoses, the prepuce becomes so thickened, and at the same time so elongated, that it resembles the body of the penis, and has led some into the mistake of supposing they had cut off a portion of the penis itself, when it was only a monstrous phymosis.

CHAP. XII.

OF THE PARAPHYMOSIS.

THE paraphymosis is a disease of the penis, where the prepuce is fallen back from the glans, and cannot be brought forwards to cover it. There are many whose penis is naturally thus formed, but without any inconvenience; so that since the time of the Romans (some of whom thought it indecent to have the glans bare) it has not been usual, as I can find, to perform any operation upon that account; but we read the several processes of it described very particularly by Celsus, who does not speak of it as an uncommon thing. Most of the instances of this distemper are owing to a venereal cause: but there are some, where the prepuce is naturally very tight, which take their rise from a sudden retraction of it, and immediate enlargement of the glans preventing its return. Sometimes it happens that the surgeon succeeds in the reduction immediately, by compressing the extremity of the penis, at the time he is endeavouring to advance the prepuce; if he does not, let him keep it suspended, and attempt again, after having fomented, and used some emollient applications; but if, from the contraction below the corona glandis, there is so great a

ſtricture as to threaten a gangrene, or even if the penis is much enlarged by water in the membrana reticularis, forming tumours called cryſtallines, three or four ſmall inciſions muſt be made with the point of a lancet, into the ſtricture and cryſtallines, according to the direction of the penis; which, in the firſt caſe, will ſet free the obſtruction, and in the other evacuate the water. The manner of dreſing afterwards, muſt be with fomentations, digeſtives, and the theriaca Londinenſis over the pledgets.

CHAP. XIII.

OF THE PARACENTESIS.

THIS operation is an opening made into the abdomen, in order to empty any quantity of extravaſated water, collected in that ſpecies of dropſy called the aſcites; but as there is much more difficulty in learning when to perform, than how to perform it, and indeed in ſome inſtances requires the niceſt judgement, I ſhall endeavour to ſpecify the diſtinctions which render the undertaking more or leſs proper.

There are but two kinds of dropſy, the anaſarca, called alſo leucophlegmacy, when the extravaſed water ſwims in the cells of the membrana adipoſa: and the aſcites, when the water poſſeſſes the cavity of the abdomen: in the firſt kind, the water is clear and limpid, but in the ſecond, a little groſſer, very often gelatinous and corrupted, and ſometimes even mixed with fleſhy concretions. I do not mention the tympany or flatulent dropſy of the abdomen; nor have I, in the chapter of Hernias, ſpoke of the hernia ventoſa, it being certain that the aſcites and bubonocele, have generally been miſtaken for thoſe diſeaſes; though there are ſome few inſtances where an enormous tumour of the abdomen ariſes from exceſſive flatulencies, and diſtenſions of the inteſtines.

It is of no great conſequence in the practice of phyſic or ſurgery, whether the water is diſcharged by a rupture of the lymphatics, or a tranſudation through the pores of their relaxed coats, ſince the fact is eſtabliſhed, that they have a power ſometimes of abſorbing the fluid, lying thus looſe, and conveying it into the courſe of the circulation; after which, it is often totally carried off by ſome emunctory of the body. The great diſpoſition there is in nature to fix upon the kidneys and glands of the inteſtines for this end, has put phyſicians upon promoting it by cathartics and diuretics, which ſometimes entirely carry off the diſtemper. If any one ſhould doubt of the poſſibility of a cure when the water is extravaſated, let him inject through a ſmall opening into the thorax or abdomen of a dog, a pint of warm water, and upon diſſection ſome few hours after, he ſhall not find one drop left there, which puts out of diſpute this power of abſorption; but indeed, though we do not much attend to it, it is by this very act the circulation is carried on regularly, with reſpect to ſome, if not all the ſecretions, which would overload their receptacles if they were not thus taken up again. The example ſerving for illuſtration, may be the circulation of the aqueous humour of the eye, which no one queſtions is an extravaſated fluid.

The operation of tapping is ſeldom the cure of the diſtemper: but dropſies, which are the conſequence of a mere impoveriſhment of the blood, are leſs likely to return than thoſe which are owing to any previous diſorder of the liver; and it is not uncommon for dropſies that follow agues, hæmorrhages, and diarrhœas, to do well; whereas in ſuch as are complicated with a ſchirrous liver, there is hardly an example of a cure.

The water floating in the belly is, by its fluctuation, to determine whether

ther the operation be adviseable; for if, by laying one hand on any part of the abdomen, you cannot feel an undulation from striking on an opposite part with the other, it is to be presumed there will be some obsticle to the evacuation. It sometimes happens that a great quantity, or almost all the water, is contained in little bladders, adhering to the liver and the surface of the peritonæum, known by the name of hydatids, and the rest of it in different-sized ones, from the degree of a hydatid, to the size of a globe holding half a pint, or a pint of water. This is called the encysted dropsy, and from the smallness of its cysts, makes the operation useless, but is not difficult to be distinguished, because there is not a fluctuation of the water; unless it is complicated with an extravasation.

When the fluctuation is hardly perceptible (except the teguments of the abdomen are very much thickened by an anasarca) in all probability the fluid is gelatinous. I have had instances, where it was too viscid to pass through a common trocar, on which account it is proper to be furnished with a couple, of the size described in the copper-plate. I once tapped a person when the fluid would not pass even through the large one; so to ease him from the distension he laboured under, I dilated the orifice with a large sponge-tent, and afterwards extracted a prodigious quantity of distinct concreted hydatids, differing in nothing, as I could discover, from the nature of a polypus formed in the nose.

There is another kind of dropsy, which for the most part forbids the operation, and is peculiar to women, being seated in the body of one or both ovaries. There is, I believe, no example of this species, but what may be known by the hardness and irregularity of the tumour of the abdomen, which is nearly uniform in the other case.

When the ovary is dropsical, the water is generally deposited in a great number of cells formed in the body of it, which circumstance makes the fluctuation insensible, and the perforation useless; tho' sometimes there are only one or two cells, in which case, if the ovary is greatly magnified, the undulation will be readily felt, and the operation be adviseable. I once tapped a gentlewoman in this circumstance, whose ovary, upon the puncture, yielded but half a pint of water; but being still persuaded, by the feel, that there was a large cyst, I tapped her in another part, and drew away near a gallon. I had an opportunity, after her death, to be convinced of this fact, by examining the body.

When the ascites and anasarca are complicated, it is seldom proper to perform the operation, since the water may be much more effectually evacuated by scarifications in the legs than by tapping.

Upon the supposition nothing forbids the extraction of the water, the manner of operating is this:—Having placed the patient in a chair of a convenient height, let him join his hands so as to press upon his stomach; then dipping the trocar in oil, you stab it suddenly through the teguments, and withdrawing the perforator, leave the waters to empty by the canula; the abdomen being, when filled, in the circumstance of a bladder distended with a fluid, would make it indifferent where to wound; but the apprehension of hurting the liver, if it be much enlarged, has induced operators rather to choose the left side, and generally in that part which is about three inches obliquely below the navel. If the navel protuberates, you may make a small puncture with a lancet through the skin, and the waters will be readily voided by that orifice, without any danger of a hernia succeeding, as is apprehended by many writers; though it should be carefully attended to, whether the protuberance is formed by the water or an exomphalos, in which latter case the intestine would be wounded, and

and not without the greateſt danger.

The ſurgeon neither in opening with the lancet, nor perforating with the trocar, need fear injuring the inteſtines, unleſs there is but little water in the abdomen, ſince they are too much confined by the meſentery, to come within reach of danger from theſe inſtruments; but it ſometimes happens, that when the water is almoſt all emptied, it is ſuddenly ſtopped by the inteſtine or omentum preſsing againſt the end of the canula; in which caſe you may puſh them away with a probe. During the evacuation, your aſſiſtants muſt keep preſsing on each ſide of the abdomen, with a force equal to that of the waters before contained there; for by neglecting this rule, the patient will be apt to fall into faintings, from the weight on the great veſſels of the abdomen being taken off, and the ſinking of the diaphragm ſucceeding, in conſequence of which, more blood flowing into the inferior veſſels than uſual, leaves the ſuperior ones of a ſudden too empty, and thus interrupts the regular progreſs of the circulation. To obviate this inconvenience, the compreſſion muſt not only be made with the hands during the operation, but be afterwards continued, by ſwathing the abdomen with a roller of flannel, about eight yards long, and five inches broad, beginning at the bottom of the belly, ſo that the inteſtines may be boren up againſt the diaphragm; you may change the roller every day, till the third or fourth day, by which time the ſeveral parts will have acquired their due tone. For the dreſſing, a piece of dry lint and plaſter ſuffice; but between the ſkin and roller, it may be proper to lay a double flannel a foot ſquare, dipped in brandy or ſpirits of wine.

This operation, though it does not often abſolutely cure, yet it ſometimes preſerves life a great many years, and even a pleaſant one, eſpecially if the waters have been long collecting. I have known ſeveral inſtances of people being tapped once a month, for many years, who felt no diſorder in the intervals, till towards the time of the operation, when the diſtenſion grew painful; and there are inſtances, where the patient has not relapſed after it. Upon the whole, there is ſo little pain or danger in the operation, that, in conſideration of the great benefits ſometimes received from it, I cannot but recommend it as exceedingly uſeful.

PLATE III.

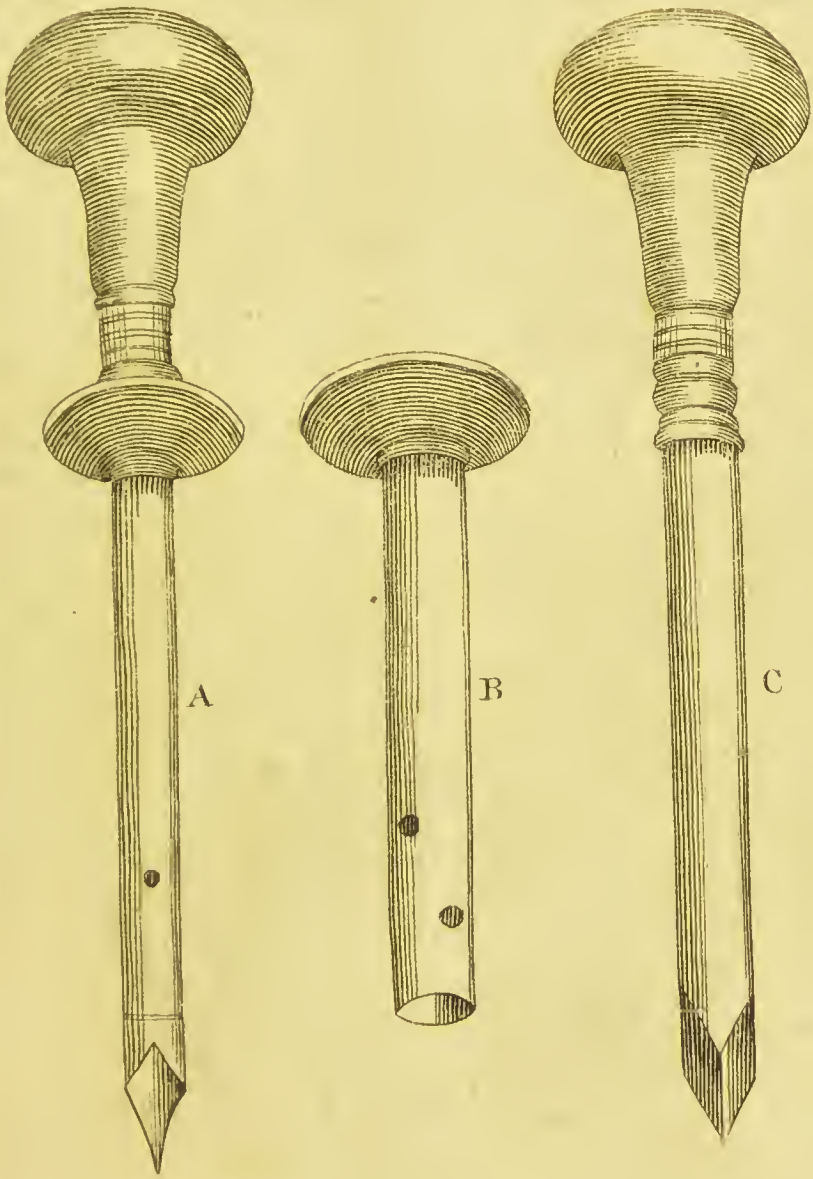
THE EXPLANATION.

A. A trocar of the moſt convenient ſize for emptying the abdomen, when the water is not gelatinous. It is here repreſented with the perforator in the canula, juſt as it is placed when we perform the operation.

B. The canula of a large trocar, which I have recommended in caſes where the water is gelatinous.

C. The perforator of the large trocar.

The handle of the trocar is generally made of wood, the canula of ſilver, and the perforator of ſteel; great care ſhould be taken by the makers of this inſtrument, that the perforator ſhould exactly fill up the cavity of the canula; for unleſs the extremity of the canula lies quite cloſe and ſmooth on the perforator, the introduction of it into the abdomen will be very painful: to make it ſlip in more eaſily, the edge of the extremity of the canula ſhould be thin and ſharp; and I would recommend, that the canula be ſteel, for the ſilver one being of two ſoft a metal, becomes jagged or bruiſed at its extremity with very little uſe. After the operation, the canula muſt be wiped clean and dry, by drawing a ſlip or two of flannel through it; otherwiſe, when the perforator is put into it, they will both grow ruſty.


A
B
C

CHAP. XIV.

OF THE FISTULA IN ANO.

THE fistula in ano, without any regard to the strict definition of the word, is generally understood to be an abscess, running upon or into the intestinum rectum; though an abscess in this part, when once ruptured, does generally, if neglected, grow callous in its cavity and edges, and becomes at last what is properly called a fistula.

That the anus is so often exposed to this malady, in any crisis of the constitution, is chiefly ascribed to the depending situation of the part; but what very much conduce to it likewise, are the great quantities of fat surrounding the rectum, and the pressure the hæmorrhoidal vessels are liable to, which being sustained upon very loose membranes, will be less able to resist any effort that nature shall exert, to sling off a surcharge; and from one step to another, that is, from inflammation to suppuration, lead on to the distemper we are treating of. That the fat is the proper subject of abscesses, may be learned from an inflammation of the skin affecting the membrana adiposa, and producing matter there; in which case a suppuration frequently runs from cell to cell, and in a few days, lays bare a great quantity of flesh underneath, without affecting the flesh itself: nay, I think it may be doubted, whether in those abscesses which are esteemed suppurations of the muscles, the inflammation and matter are not absolutely first formed in this membrane, where it is insinuated in the interstices of their fibres.

The piles, which are little tumours formed about the verge of the anus, immediately within the membrana interna of the rectum, do sometimes suppurate, and become the forerunners of a large abscess; also external injuries here, as in every other part of the body, may produce it; but from whatever cause the abscess arise, the manner of operating upon it will be according to the nature and direction of its cavity.

If the surgeon have the first management of the abscess, and there appear an external inflammation upon one side of the buttock only; after having waited for the proper maturity, let him with a knife make an incision the whole length of it; and in all probability, even though the bladder be affected, the largeness of the wound, and the proper application of dossils lightly pressed in, will prevent the putrefaction of the intestine, and make the cavity fill up like imposthumations of other parts.

If the sinus be continued to the other buttock, almost surrounding the intestine; the whole course of it must be dilated in like manner; since in such spongy cavities, a generation of flesh cannot be procured but by large openings; whence also, if the skin is very thin, lying loose and flabby over the sinus, it is absolutely necessary to cut it quite away, or the patient will be apt to sink under the discharge, which in the circumstance here described, is sometimes excessive. By this method, which cannot be too much recommended, it is amazing how happy the event is likely to be; whereas, from neglecting it, and trusting only to a narrow opening, if the discharge do not destroy the patient, at least the matter by being confined corrupts the gut, and insinuating itself about it, forms many other channels, which running in various directions, often baffle an operator, and have been the cause of a fistula being so generally esteemed very difficult of cure.

Here I have considered the imposthumation as possessing a great part of the buttock; but it more frequently happens, that the matter points with a small extent of inflammation on the skin, and the direction of the sinus is even with the gut: In this case, having made a pucture, you may with a probe learn if it has penetrated into the intestine, by passing your finger up it, and feeling the probe introduced

troduced through the wound into its cavity: though for the moſt part, it may be known by a diſcharge of matter from the anus. When this is the ſtate of the fiſtula, there is no heſitation to be made; but immediately putting one blade of the ſciſſars up the gut, and the other up the wound, ſnip the whole length of it. This proceſs is as adviſeable when the inteſtine is not perforated, if the ſinus is narrow, and runs upon or very near it; for if the abſceſs be tented, which is the only way of dreſsing it while the external orifice is ſmall, as I have here ſuppoſed, it will almoſt certainly grow callous; ſo that the ſureſt means of cure will be opening the gut, that proper applications may be laid to the bottom of the wound. However, it ſhould be well attended to, that ſome ſinuſes pretty near the inteſtine neither run into nor upon it, in which caſe they muſt be opened, according to the courſe of their penetration. There are abundance of inſtances, where the inteſtine is ſo much ulcerated, as to give free iſſue to the matter of the abſceſs by the anus; but I believe there are none where there is not, by the thinneſs and diſcolouration of the ſkin, or an induration to be perceived through the ſkin, ſome mark of its direction; which, if diſcovered, may be opened into with a lancet, and then it becomes the ſame caſe as if the matter had fairly pointed.

If the ſinuſes into and about the gut are not complicated with an induration, and you can follow their courſe, the mere opening with ſciſſars, or a knife guided on a director, will ſometimes ſuffice; but it is generally ſafer to cut the piece of fleſh, ſurrounded by theſe incifions, quite away; and when it is callous, abſolutely neceſſary, or the calloſities muſt be waſted afterwards by eſcharotic medicines, which is a tedious and cruel method of cure.

When the fiſtula is of long ſtanding, and we have choice of time for opening it, a doſe of rhubarb the day before the operation will be very convenient, as it not only will empty the bowels but alſo prove an aſtringent for a while, and prevent the miſchief of removing the dreſsings in order to go to ſtool.

It ſometimes happens that the orifices are ſo ſmall, as not to admit the entr nce of the ſciſſars; in which caſe, ſponge-tents muſt be employed for their dilatation.

In performing theſe operations on the anus, I do not think in general any inſtrument ſo handy as a knife and ſciſſars; almoſt all the others which have been invented to facilitate the work, are not only difficult to manage, but more painful to the patient; however, in thoſe inſtances where the fiſtula is very narrow, and opens into the inteſtines, juſt within the verge of the anus, the ſyringotomy may be uſed with advantage; but where the opening into the gut is high, it cannot be employed without giving great pain. I do not caution againſt cutting the whole length of the ſphincter, experience having ſhewn it may be done with little danger of an incontinence of excrement; and in fact the muſcle is ſo ſhort, that it muſt generally be cut through in dilatations of the inteſtine.

The worſt ſpecies of fiſtula is that communicating with the urethra, and ſometimes (through the proſtate gland) with the bladder itſelf. This generally takes its riſe from a former gonorrhœa, and appears externally firſt in perinæo, and afterwards increaſing more towards the anus, and even ſometimes into the groin, burſts out in various orifices through the ſkin, which ſoon becomes callous and rotten; and the urine, paſsing partly through theſe orifices, will often excite as much pain, and of the ſame kind, as a ſtone in the bladder.

This ſpecies of fiſtula taking its riſe from ſtrictures of the urethra, is only manageable by the bougie: for ſo long as the urethra is obſtructed, the cure of the fiſtula will be imperfect; but if the canal be opened by this

this application, it is amazing what obstinate indurations and foul sinuses will in consequence disappear; though there are some so callous and rotten as to demand the knife and skilful dressings, notwithstanding the urethra should be dilated by the use of bougies.

CHAP. XV.

OF THE PUNCTURE OF THE PERINÆUM.

THIS operation is performed when the bladder is under such a suppression of urine as cannot be relieved by any gentler methods, nor by reason of the obstruction in its neck, or the urethra, will admit of the introduction of the catheter. The manner of doing it, as described by most writers, is by pushing a common trocar from the place where the external wound in the old way of cutting is made, into the cavity of the bladder, and so procuring the issue of the water through the canula; but others, refining upon this practice, have ordered an incision to be carried on from the same part into the bladder, and then to insinuate the canula. But in my opinion, both the methods are to be rejected, in favour of an opening a little above the os pubis; for besides that it is not easy to guide the instrument through the prostate gland into the bladder, the necessity of continuing it, in a part already very much inflamed and thickened, seldom fails to do mischief, and even to produce a mortification.

Some time since, a gentlewoman complained of a difficulty in making water, which she voided by drops with excessive pain; and soon after, the urinary passage became totally obstructed. Having in vain attempted to pass the smallest catheter I could get, I introduced my finger into the vagina, and felt a very hard tumour about the neck of the bladder: the patient had not voided any water for five days, and being in the utmost agony, and, as we judged, within a few hours of dying, I put in practice the incision above the os pubis, making the wound of the skin about two inches long, and that of the bladder about half an inch: having emptied, by this means, a prodigious quantity of water, I kept the orifice open with a hollow tent, till such time as the tumour subsided, which, with proper medicines, it did by degrees; and in about six weeks the water came the right way, and some time after she recovered perfect health. I have lately practised a method still more easy both to the patient and the operator, which consists only in emptying the bladder with a common trocar, and stopping the canula with a little cork, which is afterwards to be taken out, as often as the patient has occasion to urine. The canula is to be continued in the bladder till such time as the person finds he can void his urine by the natural passage.

In this operation, the abdomen ought to be perforated about two inches above the os pubis; and if the patient be fat, the trocar should penetrate two inches, otherwise, an inch and a half will be sufficient. This precaution is of great importance, for I have seen an example, where the trocar being introduced nearer to the os pubis, the extremity of it pressed upon the lower portion of the bladder, and in a few days made a passage into the rectum.

CHAP. XVI.

OF THE STONE.

STONY concretions are a disease incident to several parts of the body; but I shall treat only of those formed in the kidneys and bladder: hitherto there has never been given any satisfactory account of the causes of this concreting disposition in the fluids; and though there may be some propriety in considering the sand of urine,

urine, in the ſame light as the tartar of wine, from their ſimilitude in ſeveral experiments, yet we cannot infer from thence, what does immediately produce it; at leaſt, it is not with any certainty to be imputed to a particular diet or climate, which, however, are the cauſes commonly aſſigned; ſince we ſee that in all countries, and among all ranks of people, as much among the ſober as the luxurious, the ſtone is a frequent diſtemper; and though the great numbers cut at the hoſpitals of Paris, where the water of the Seine is ſo remarkable for its quantity of ſtone, ſeems to favour the opinion of its being generated by particular fluids received into the blood, yet I believe, upon enquiry, this famous inſtance will not appear concluſive, ſince moſt of thoſe patients come from the provinces, or diſtant villages, where the water is not drank; and as to the inhabitants of Paris itſelf, by what I was able to learn of the ſurgeons there, the number of thoſe afflicted with the ſtone among them, is pretty nearly in the ſame proportion as in London: from which conſiderations, and the circumſtance of ſo many more children having the ſtone than men, one would be inclined to think the diſpoſition is much oftener born with us, than acquired by any external means. I once ſaw a ſtone in the kidney of a fœtus, at the term of ſeven months growth, which, had it lived, was two months before it would have been born.

It is certain the urine generally abounds with matter proper to compoſe a ſtone, and perhaps if it could grow cold in the bladder, it would always depoſit the matter there, as it does on the ſides of the chamber-pot, though the coats of the bladder being covered with a mucilage, makes them more unfit than the ſides of the pot, to attract the ſtony particles; but we ſee when once a hard body is inſinuated into the bladder, it ſeldom fails to become the nucleus of a ſtone, whether it be a large piece of gravel, a needle, a bullet, or any other firm extraneous ſubſtance, even grumous blood.

From the monſtrous increaſe of ſome ſtones in a ſhort time, and the ceſſation of growth for many years of others, we may be perſuaded that the conſtitution varies exceedingly at different times, with regard to theſe ſtony ſeparations; and from the appearances of moſt ſtones, when artfully ſawed through, we may gather that this variation of conſtitution does not ſhew itſelf only in the quantity of gravel added to the ſtone, but the quality of it alſo; ſo that a red uniform ſtone of an inch diameter, may perhaps, at half that ſize, have been a ſmooth white one; at a quarter, a brown mulberry one; and ſo on, at different times, altering in its ſpecies. Hence (from the appoſition of differently-coloured gravel) ariſes for the moſt part the laminated appearance of a ſtone; though ſometimes the laminæ are very nearly of the ſame colour and compoſition; and in this caſe, their formation ſeems to be owing to the want of accretion in the ſtone for a certain time, during which, its ſurface, by rubbing againſt the coats of the bladder, and its attrition from the ſtream of urine, becomes ſmooth and compact; ſo that when more freſh looſe gravel adheres to it, its different denſity in that part will neceſſarily make the ſtreaks we ſee in a ſection of the ſtone, which are only the external ſurfaces of each lamina.

That the ceaſing to grow gives them this laminated form, and not any particular diſpoſition in ſand to ſhoot into ſuch a ſhape, is probable from the examination of ſome other ſtones, in which a great quantity of gravel is firſt collected without any nucleus, into a ſpongy uniform maſs, and after that is covered with ſeveral laminæ.

It is no wonder that ſtones ſo generally form in the kidneys, ſince the diſpoſition of the urine will naturally ſhew itſelf as ſoon as it is ſeparated into the pelvis, that is, the ſtony

particles

particles having as ſtrong an endeavour to unite with one another in the kidneys as the bladder, will conſequently, from meeting firſt there, generally produce gravel and ſtone in that part; nay, I have found by opening the kidneys of calculous people, that ſtone is formed even earlier than I have here ſuggeſted, for in them the tubuli belliniani were full of gravel.

Small ſtones and gravel are frequently voided without pain; but ſometimes they collect and become very large in the kidneys; in which caſe, a fit of the ſtone in that part is the cure, from the inflammation and pain occaſioning convulſive twitches, which at laſt expel them: but in this diſeaſe, the patient is very much relieved by ſeveral kinds of remedies, ſuch as the mucilaginous, the ſaponaceous, &c. ſome of which lubricate, and others both lubricate and ſtimulate. The ſand in paſſing through the ureters, is very much forwarded by the force of the urine, which is ſo conſiderable, that I have ſeen a ſtone that was obſtructed in the ureter in its firſt formation, perforated quite through its whole length, and form a large channel for the ſtream of urine. The ureters being very narrow, as they run over the pſoas muſcle, and alſo at their entrance into the bladder, make the movement of the ſtone very painful and difficult in thoſe parts: but there is ſeldom ſo much trouble after the firſt fit; for when once they have been dilated, they generally continue ſo; I have often ſeen them as big as a man's finger, but they have been found much larger.

When once a ſtone has acquired a moderate ſize in the bladder, it uſually occaſions the following complaints; frequent inclination to make water, exceſſive pain in voiding it drop by drop, and ſometimes a ſudden ſtoppage of it, if diſcharged in a ſtream; after urining, great torture in the glans penis, which laſts one, two, or three minutes; and in moſt conſtitutions, the violent ſtraining makes the rectum contract, and expel its excrements, or, if it be empty, occaſions a teneſmus, which is ſometimes accompanied with a prolapſus ani; the urine is often tinctured with blood from a rupture of the veſſels, and ſometimes pure blood itſelf is diſcharged; ſometimes the urine is very clear, but frequently there are great quantities of ſlimy ſediment depoſited at the bottom of it, which is no other than a preternatural ſeparation of the mucilage of the bladder, but has been often miſtaken for pus; whence has ariſen an opinion, that ulcers of the bladder are common, though, in fact, the diſtemper is very rare.

Theſe are the ſymptoms of the ſtone in the bladder, yet by no means are they infallible; ſince a ſtone in the ureter or kidneys, or an inflammation of the bladder from any other cauſe, will ſometimes produce the ſame effects: but if the patient cannot urine, except in a certain poſture, it is almoſt a ſure ſign the orifice is obſtructed by a ſtone; if he finds eaſe by preſſing againſt the perinæum with his fingers, or ſitting with that part upon a hard body, there is little doubt to be made that the eaſe is procured by taking off the weight of the ſtone; or laſtly, if with moſt of theſe complaints, he thinks he can feel it roll in his bladder, it is hardly poſſible to be miſtaken; however, the only ſure judgement to be formed, is from ſearching.

That we ſhould not readily diſtinguiſh the complaints of the ſtone from many other affections of the bladder, is not very ſurpriſing, when we reflect that a fit of the ſtone is nothing but an inflammation of its coats, which, though it be excited by the ſtone, requires a diſpoſition in the blood to produce it; for if the complaints in a fit were owing to the immediate irritation of the bladder, it ſhould follow, that the ſtone being always the ſame, the fit would be continual; but beſides that all patients have conſiderable intervals of eaſe (often of many months) except in

 thoſe

those eases where the stone is either very large or pointed, there are instances of some few happy constitutions, where they have no pain, even after having, for a certain time, suffered very much.

To prevent the violence, and frequent returns of the fits of the stone, bleeding and gentle purging with manna, are beneficial; abstaining also from malt-liquors, and excess of eating and drinking, is very serviceable; but the milk-diet and honey are the greatest preventives, not only of inflammation, but perhaps sometimes too of the farther accretion of the stone.

From considering the disorders of the stone in this light, and the frequent intervals of ease which happen without the assistance of medicine, we cannot wonder that so many patients have believed the stone dissolved, when they have been under any particular regimen; and that in all ages there have been many people deceived for a length of time, by a supposed dissolvent, though we have not hitherto known any safe one, till lately that lime and soap have been discovered to have sometimes that effect.

CHAP. XVII.

OF SEARCHING.

THE patient being laid on a horizontal table, with his thighs elevated, and a little extended, pass the sound with the concave part towards you, till it meets with some resistance in perinæo, a little above the anus; then turning it without much force, push it gently on into the bladder; and if it meets with any obstruction at the neck, raise its extremity upwards, by inclining the handle of it towards you; or if it does not then slip in, withdraw it a quarter of an inch, and introducing your fore-finger into the rectum, lift it up, and it will seldom fail to enter: there is some art in turning the sound in the proper place of the urethra, which surgeons not versed in this operation, cannot so well execute; therefore they may pass the instrument with the concave side always towards the abdomen of the patient, observing the same rule at the enterance into the bladder, as in the other method. The cause of this obstacle, besides the rugæ of the urethra, and the resistance of the verumontanum, is sometimes a small projection of the orifice of the bladder in the urethra, like that of the os tincæ in the vagina, which occasions the end of the sound to slip a little beyond it.

It is not to be supposed that by searching, one can possibly judge of the size and form of a stone; and indeed the frequency of the fits, and violence of the symptoms, are a better rule to go by; though whoever shall think himself capable of distinguishing absolutely the difference of stones, even by these circumstances, will sometimes be mistaken; since the frequency and violence of the pain, depend not always merely upon their magnitude or shape; and there are some instances where a stone of six grains weight, has for several months given more pain in one person, than a much larger has in another; however, *cæteris paribus*, a large or rough stone, is worse than a small or a smooth one.

Though upon searching, we are assured of a stone in the bladder, we are not, without farther enquiry, to operate immediately; since there are sometimes obstacles which forbid the operation, either absolutely, or only for a certain time; among these, that of great consequence is the gravel or stone in the kidneys, which is known by the pain in the loins, vomitings, contractions of the testicles, numbness of the thighs, and often by matter which the inflammation produces in the kidneys. The objections of less weight, and which frequently are removed, are a fit of the stone, a cough, a hectic, and being emaciated

by long pain; excessive hot or cold weather, are likewise hinderances: but in extremity of danger, these last considerations may be disregarded, though no doubt very hot weather is more inconvenient and dangerous than cold, as lying a-bed is then more troublesome, and the urine much salter.

Difference of age makes an extreme difference in danger, infants and young people almost always recovering; but still the operation is adviseable on those advanced in years, though it is not attended with near the same success. This operation is performed four several ways, all which I shall describe, with their particular inconveniencies, that we may the more easily pitch upon that which has the least.

Before we perform any of them, it will be proper to prepare the patient with a gentle purge the preceding day, and a clyster early in the morning, which will be of great service in cooling the body, and making some of the operations less dangerous where the rectum is liable to be wounded when full.

CHAP. XVIII.

OF THE LESSER APPARATUS, OR CUTTING ON THE GRIPE.

THE most ancient way of cutting for the stone, is that described by Celsus, and known by the name of cutting on the gripe, though, since the time of Johannes de Romanis, it is also called, cutting with the lesser apparatus, to distinguish it from his new method, which, on account of the many instruments employed in it, is called cutting with the greater apparatus. The manner of doing the operation is this: you first introduce the fore-finger and middle-finger of the left hand, dipped in oil, up the anus, and pressing softly with your right hand above the os pubis, endeavour to bring the stone towards the neck of the bladder; then making an incision, on the left side of the perinæum, above the anus, directly upon the stone, you turn it out through the wound, either with your fingers or a scoop.

This way of cutting was attended with many difficulties, for want of proper instruments to direct the incision, and extract the stone when it lay beyond the reach of the fingers, which in a large bladder was frequently the case; so that it is strange Celsus confined the operation to the age between nine and fourteen, since it is much easier to be performed in infancy than at those years; and it plainly appears from his account of it, that many died from the violence done to the bladder in endeavouring to bring the stone forwards, though the operators failed in their attempt, and the patients were not cut.

The wound of the bladder in this operation is made in the same place as is now practised in the lateral method; but it being impracticable on some subjects, and uncertain on all others, has made it universally exploded; so that no body now makes an incision without the direction of a staff, unless a stone entirely prevents the introduction of it, by pressing against, and stopping up the neck of the bladder; and in this case, when we cut directly upon the stone, it is much safer to push it back farther into the bladder, and lay hold of it with the forceps, than to endeavour with the scoop or fingers to force it outwards, which circumstance alone makes it different from Celsus's method. It must be distinguished however, when I speak of pushing the stone back, that I suppose it in the neck of the bladder; for it frequently happens that it lies at the extremity of the urethra, on the outside of the bladder; in which case the wound of the urethra may be made large enough to turn it out with the fingers, or the end of some slender instrument.

CHAP. XIX.

OF THE GREATER APPARATUS, OR THE OLD WAY.

THIS method of cutting, invented by Johannes de Romanis, and publiſhed by his ſcholar Marianus in the year 1524, has at different times, and with different people, varied conſiderably in ſome of its proceſſes, and particularly with regard to the uſe of certain inſtruments. What I ſhall deſcribe, will be the manner in which it is now practiſed with all its improvements.

Having laid the patient on a ſquare horizontal table, three feet four inches high, with a pillow under his head, let his legs and thighs be bent, and his heels made to approach his buttocks, by tying his hands to the bottom of his feet with a couple of ſtrong ligatures, about two yards long; and to ſecure him more effectually from ſtruggling, paſs a double ligature under one of his hams, and carry the four ſtrings round his neck to the other ham; then paſſing the loop underneath it, make a knot by threading one of the ſingle ends through the loop: after this, the thighs being widened from each other, and firmly ſupported by proper perſons, you introduce the ſtaff, having firſt dipped it in oil, which muſt be held by your aſſiſtant, a little leaning on the left ſide of the ſeam in perinæo; and beginning the external wound juſt below the ſcrotum (which muſt be held out of the way) you continue it downwards, to within two fingers breadth of the anus; then leaving that direction, you ſlip the knife forwards in the groove, pretty far into the bulbous part of the urethra; or, as there is ſome danger of wounding the rectum, in the continuation of the inciſion you may turn the knife with the back towards it, and make this part of the inciſion from within outwards. Should a very large veſſel be cut, it will be adviſeable to tie it before you proceed any farther in the operation. When the wound is made, ſlide the gorget along the groove of the ſtaff into the bladder; and to do it with more ſafety, when the beak of it is received in the groove, it will be proper to take the ſtaff yourſelf in your left hand; for if the aſſiſtant ſhould, unwarily, either incline the handle of it too much towards you, or not reſiſt enough to the force of the gorget, it is very apt to ſlip out of the groove, between the rectum and the bladder, which accident is not only inconvenient to the operator for the preſent, but is attended for the moſt part with very bad conſequences. The gorget being paſſed, dilate the urethra and neck of the bladder with your fore-finger, and introduce the forceps into the bladder, keeping them ſhut till you touch the ſtone, when you muſt graſp it with a moderate force, and extract it by pulling downwards towards the rectum. Should you find a difficulty in laying hold of the ſtone, be careful to keep your forceps in ſuch a poſition, that they may open upwards and downwards (not laterally) which will very much facilitate the embracing of the ſtone, in caſe it ſhould happen to be thin and flat.

CHAP. XX.

OF THE HIGH OPERATION.

THIS method of cutting for the ſtone was firſt publiſhed in the year 1561, by Pierre Franco, who, in his Treatiſe of Hernias, ſays he once performed it on a child with very good ſucceſs, but diſcourages the farther practice of it. After him, Roſſetus recommended it with great zeal, in his book intitled Partus Cæſareus, printed in 1591; but he never performed the operation himſelf. Monſieur Tolet makes mention of its having been tried in the Hotel Dieu; but without entering into the particular cauſes of its diſcontinuance, ſays only that it was found inconvenient.

nient. About the year 1719, it was first done in England by Mr. Douglas, and after him practised by others. The manner of performing it, with the improvements made since Franco's operation, is this:

The patient being laid on a square table, with his legs hanging off, and fastened to the sides of it by a ligature passed above the knee, his head and body lifted up a little by pillows, so as to relax the abdominal muscles, and his hands held steady by some assistants; inject through a catheter into the bladder as much barley-water as he can bear, which, in a man, is often about eight ounces, and sometimes twelve: for the more easily doing this, an ox's ureter may be tied to the extremity of the syringe, and handle of the catheter, which being pliable, will prevent any painful motion of the instrument in the bladder.

The bladder being filled, an assistant, in order to prevent the reflux of the water, must grasp the penis the moment the catheter is withdrawn, holding it on one side in such a manner as not to stretch the skin of the abdomen; then with a round-edged knife make an incision about four inches long, between the recti and pyramidal muscles, through the membrana adiposa, as deep as the bladder, bringing its extremity almost down to the penis; after this, taking a crooked knife, continue the incision into the bladder, carrying it a little under the os pubis, and immediately upon the water's flowing out, introduce the fore-finger of your left hand, which will direct the forceps to the stone.

This method was at first received with great applause in London; but, after some trial, was rejected for the following inconveniencies:

It sometimes happens that the bladder, notwithstanding the injection, still continues so deep under the os pubis, that the peritonæum being necessarily wounded first, the intestines push out immediately at the orifice, and the urine afterwards empties into the abdomen; in which case, hardly any recover. The injection itself is exceedingly painful, and however slowly the fluid be injected, it distends the bladder so much more suddenly than the urine from the kidneys does, and so much faster than it can well bear, that it not only is seldom dilated enough to make the operation absolutely secure, but is sometimes even burst, or at least its tone destroyed by the hasty dilatation. What adds to the danger here, is the possibility of meeting with a contracted indurated bladder, which is a circumstance sometimes attending on the stone, and indeed an exceedingly dangerous one in all the other methods, but would be frightful in this, by reason not only of the necessity of wounding the peritonæum, but of the difficulty of coming at the stone. If the stone be very small, it is hard to lay hold of it with the forceps, and in a fat man, the fingers are not long enough for that purpose. If there are many little stones, it will scarce happen that more than one at a time can be extracted; and if the stone breaks, it not only is impracticable to take it all away in the operation, but also from the supine posture of the patient, it will generally remain in the bladder; whereas in the other methods, for the most part, it works itself out with the urine. But even supposing that the operation itself is prosperous, the consequences generally are very troublesome; for the urine issuing out at an orifice where there is no descent, spreads itself upon the abdomen, and makes very painful excoriations; though, what is still worse, it sometimes insinuates itself into the cells between the bladder and abdominal muscles, and together with the inflammation excited by the operation, brings on a suppuration there, which is always difficult to manage, and frequently mortal.

CHAP.

CHAP. XXI.

OF THE LATERAL OPERATION.

THIS method was invented by an ecclesiastic, who called himself Frere Jaques. He came to Paris in the year 1697, bringing with him an abundance of certificates of his dexterity in operating; and making his history known to the court, and magistrates of the city, he got an order to cut at the Hotel Dieu, and the Charité, where he performed this operation to about fifty persons. His success did not answer the promises he had made; and from that time his reputation seems to have declined in the world, if we may give credit to Dionis, who has furnished us with these particulars.

He was treated by the surgeons of those times as ignorant and barbarous; and though upon enquiry into the parts which suffer in this method, it was once the opinion of some of the most eminent among them, that it might be made a most useful operation, if a few imperfections in the execution of it were removed; yet, after having given this judgement, they suddenly dropped the pursuit, for no other reason, to all appearance, but that they would not be obliged to any one but a regular surgeon for a discovery of so great consequence. The principal defect in his manner of cutting, was the want of a groove in his staff, which made it difficult to carry the knife exactly into the bladder; nor did he take any care of his patients after the operation; so that for want of dressings, some of the wounds proved fistulous, and other ill consequences ensued. But I am inclined to think he succeeded better, and knew more at last, than is generally imagined; for I remember to have seen, when I was in France, a small pamphlet, published by him in the year 1702, in which his method of operation appeared so much improved, that it differed in nothing, or but very little, from the present practice. He had by this time learnt the necessity of dressing the wound after the operation, and had profited so much from the criticisms of Messrs. Mery, Fagon, Felix, and Hunauld, that he then used a staff with a groove; and what is more extraordinary, had cut thirty-eight patients successively at Versailles, without losing one, as appeared by a certificate annexed to the piece.

Amongst many that saw Frere Jaques operate, was the famous professor Rau, who carried his method into Holland, and practised it with amazing success. He never published any account of it himself, though he admitted several to his operations; but since his death, his successor Albinus, professor of anatomy and surgery at Leyden, has given the world a very circumstantial detail of the several processes of it, and mentions as an improvement upon Frere Jaques's manner, that he made his incision through the bladder beyond the prostate; but whoever will try the experiment of making a wound in that place, without touching the prostate, on a staff, such as Albinus has delineated, which is of an ordinary length, will find it almost impracticable; for if by inclining the staff a little towards the abdomen and right groin, you endeavour to raise that part of the bladder towards the wound, it slips out all but the very end of it into the urethra, and leaves no direction for the knife. Besides, that he cut the prostate may be gathered from the event of some cases which Mr. Cheselden published, when he first undertook the lateral operation: he considered it as almost impossible to make the incision in this place, unless the bladder were distended, to which purpose he injected as much barley-water as the patient could suffer, which made it protuberate forwards, and lie in the way of the external wound; so that leaving the staff in, he cut very easily upon it. The operations were exceedingly dextrous;

trous; but the wound of the bladder retiring back, when it was empty, did not leave a ready iſſue for the urine, which inſinuating itſelf amongſt the neighbouring muſcles and cellular membranes, deſtroyed four of the ten which he practiſed this method upon, and ſome of the others narrowly eſcaped.

If, therefore, this was the conſequence of a wound of the bladder beyond the proſtate, in ſo many inſtances, and we find by experience that it is exceedingly difficult in ſome men to carry the inciſion even ſo far as the proſtate, ſure it is poſſible that Albinus may be miſtaken in his deſcription, or even that Rau himſelf, if he was of that opinion, might be deceived in the parts he wounded; ſince we know it was generally thought, till within theſe few years, that the bladder itſelf was cut in the old way.

After this unſucceſsful trial, Mr. Cheſelden made uſe of the following method, which is now the practice of moſt Engliſh operators:

The patient being laid on a table, with his hands and feet tied, and the ſtaff paſſed as in the old way, let your aſſiſtant hold it a little ſlanting on one ſide, ſo that the direction of it may run exactly through the middle of the left erector penis and accelerator urinæ muſcles; then make your inciſion through the ſkin and fat, very large, beginning on one ſide of the ſeam in perinæo, a little above the place wounded in the old way, and finiſhing a little below the anus, between it and the tuberoſity of the iſchium: this wound muſt be carried on deeper between the muſcles, till the proſtate can be felt, when ſearching for the ſtaff, and fixing it properly, if it has ſlipped you muſt turn the edge of the knife upwards, and cut the whole length of that gland from within outwards, at the ſame time puſhing down the rectum with a finger or two of the left-hand; by which precautions the gut will always eſcape wounding; after which, the operation finiſhes nearly in the ſame manner as with the greater apparatus.

If, upon introducing the forceps, you do not perceive the ſtone readily, you muſt lift up their handle, and feel almoſt perpendicularly for it, ſince for the moſt part when it is hard to come at, it lies in one of the ſinuſes ſometimes formed on each ſide of the neck of the bladder, which project forward in ſuch a manner, that if the ſtone lie there, the forceps paſs beyond it the moment they are through the wound; ſo that it would be impoſſible to lay hold of it, or even to feel it, if not aware of this circumſtance.

When the ſtone breaks, it is much ſafer to take away the fragments with the forceps, than to leave them to be diſcharged with the urine; and if the pieces are very ſmall, like ſand, a ſcoop is the beſt inſtrument; though ſome prefer the injecting barley-water into the bladder, which ſuddenly returning, brings away the broken particles of the ſtone.

As there are hardly any inſtances of more ſtones than one, when the ſtone taken away is rough; ſo when it is ſmooth and poliſhed in any part of it, it is almoſt a certain ſign of others behind; on which account, an operator ſhould be careful, in that caſe, to examine not only with his fingers, but ſome convenient inſtrument, for the remaining ones; though indeed, in all caſes, it may be proper to examine the bladder after the extraction of a ſtone; becauſe it is poſſible there may be a ſecond ſtone, notwithſtanding the firſt be rough.

The great inconvenience of the lateral operation is the hæmorrhage which ſometimes enſues in men; for in children the danger of it is not worth mentioning; this however is the principal objection which has prevented it being univerſally practiſed; but in all likelihood it will be more general, when the merits of the method are better known, and it is once diſcovered that the ill conſequence of moſt of theſe hæmorrhages is owing more

more to an error in operating than to the nature of the operation; for I think I can positively say, that all those branches of the hypogastric artery which lie on this side of the prostate, may be taken up with the needle, if the wound be made large enough to turn it about freely at the bottom; yet this is a circumstance that many surgeons have been deficient in, and instead of making it three or four inches long in a man, they have sometimes made it not above an inch; in which case, it is not only impossible to tie the vessels between the skin and bladder, but it also prevents the proper application of lint, or styptics to the artery creeping on the prostate: so that it is not surprising the operation should be discountenanced, when the practice of it is attended with this difficulty.

I have here mentioned lint, or styptics, as a proper application to stop the hæmorrhage from the artery of the prostate; but if they should not prove effectual, I would advise the introduction of a silver canula through the wound into the bladder, which should be three or four inches long, according to the depth of the wound; and almost as thick as a man's little finger. It must be covered with rag or lint (that it may lie soft) and continue in the bladder two or three days before it is taken away.

If in the operation any very large vessel of the external wound should be divided, it is adviseable to tie it before the extraction of the stone; but the necessity of doing this does not occur once in twenty times: it rarely happens that the vessels of the prostate burst open any considerable time after the operation, if they did not bleed during the performance of it; but as it is the nature of the symptomatic fever to dilate the vessels, and quicken the motion of the blood, it is proper to be upon our guard, especially in plethoric people, and endeavour to obviate the accident by taking away ten or twelve ounces of blood from the arm, and giving an opiate immediately.

There is but one object more of any consequence, which is the danger of wounding the rectum; and this I confess is a very troublesome accident: but if the operator observes the rule I have laid down with regard to that article, I should hope it might always be avoided.

In this description, I believe I have been so far from disguising the inconveniencies of the lateral operation, that before I speak of its advantages I should once again repeat, that these effusions of blood are but very rare, and seldom or never mortal, when properly managed; of which the world needs no better proof than the late extraordinary success we have cut with in our hospitals, which I believe has never been equalled in any time or country.

In this method the remarkable parts wounded by the knife are, the musculus transversalis penis, levator ani, and prostate gland: in the old way, the urethra only is wounded, about two inches on this side the prostate, and the instruments are forced through the rest of the passage, which is composed of the bulbous part of the urethra, the membranous part of the urethra, the neck of the bladder, and prostate gland. This channel is so very narrow, that till it be torn to pieces, the management of the forceps is exceedingly difficult, and it happens frequently that from the tender texture of the membranous parts, the forceps are unwarily pushed through it between the os pubis and bladder; besides, that in introducing the gorget upon the staff, it is apt to slip downwards, between the rectum and bladder, both which inconveniencies are avoided in the lateral operation. It is true, the wound made in the lateral method will not admit of the extraction of a large stone without laceration, as well as in the old way; but in the one case, the laceration is small, and made after a preparation for

for it by an incision, and in the other, all the parts I have mentioned are torcn without any previous opening, and which are so very tight, that the pain of the distension must necessarily be excessive. It is pity the operators do not in the old way always slide the knife along the groove of the staff, till they have quite wounded through the length of the prostate, since they are convinced, that by the extraction of the stone, it is opened in a ruder and more dangerous manner than by incision, and without any advantages from it; because this opening is made by the finishing of the operation; whereas, for want of it before the extraction, we can hardly widen the forceps enough to receive a large stone; and when we do, the resistance is so very great, as often to break it, notwithstanding all our care. However, in both these operations, the surgeon must not grasp the stone with violence, and even in extracting, must, with both hands to the branches of his forceps, resist their shutting so tight as the compression from the lips of such a narrow wound would otherwise make them: here I speak of the difficulty of laying hold of a stone in any part of the bladder; but if it happens to lie in one of the sinuses before mentioned, the forceps are so confined that it becomes still harder. The extraction of very large stones, is much more impracticable with the greater apparatus, than by this method, because of the smallness of the angle of the bones in that part where the wound is made; so that indeed it is necessary in almost all extractions to pull the stone downwards towards the rectum, which cannot be done without great violence to the membranous parts, and even the separation of one from another; whence follow abscesses and sloughs about the wound, which is a circumstance not known in the lateral operation. Ecchymoses followed by suppuration and gangrene, sometimes spread themselves upon the scrotum, and in short, all the inconveniencies and ill symptoms which attend upon the lateral operation, except the hæmorrhage, are in a more violent degree incident to the old way.

An incontinence of urine is not common after the lateral operation, and a fistula seldom or never the consequence of it; but the prevention of a fistula seems to depend very much upon the skill of dressing the wound afterwards; and perhaps it would not so often happen, if the dressing were rightly managed in the old way; though certainly this method is much more liable to them, as the wound is made among membranes, is more contused, and in many, from an incontinence of urine, is continually kept open. I have seen some instances, indeed, in the lateral operation, where, through neglect, the bladder has remained fistulous; but the wound being in a fleshy part, I have, without great difficulty, got little granulations to shoot up, and healed it externally; so that at present I think a fistula can hardly be accounted one of the inconveniencies of cutting for the stone in the lateral way.

The manner of treating the patient after the operation, is pretty nearly this: if it happens that the vessels of the prostate bleed, dry lint, or lint dipped in some styptic water, such as aqua vitrioli, must be applied to the part, and held there with a considerable degree of pressure for a few minutes; or, as I have before mentioned, a silver canula of three or four inches long, covered with fine rag, may be introduced into the bladder, and left there two or three days, which seldom fails to stop the hæmorrhage. The patient may also take an opiate. If the wound does not bleed, a little dry lint, or a pledget of digestive, laid gently in it, is best. The place where the patient lies should be moderately cool, as heat not only disposes the vessels to bleed afresh, but generally makes him low and faint. If soon after the operation he complains of a sickness at the stomach, or even

even a pain in that part of the abdomen near the bladder, it is not always a ſign of a dangerous inflammation, but frequently goes off in half an hour: to aſſiſt, however, in its removal, a fomentation put into a hog's bladder, and applied pretty warm to the part in pain, will be of great ſervice; if the pain increaſes after two or three hours, the conſequence is much to be feared; and in this caſe, bleeding and emollient clyſters, by way of fomentation to the bowels, are immediately neceſſary.

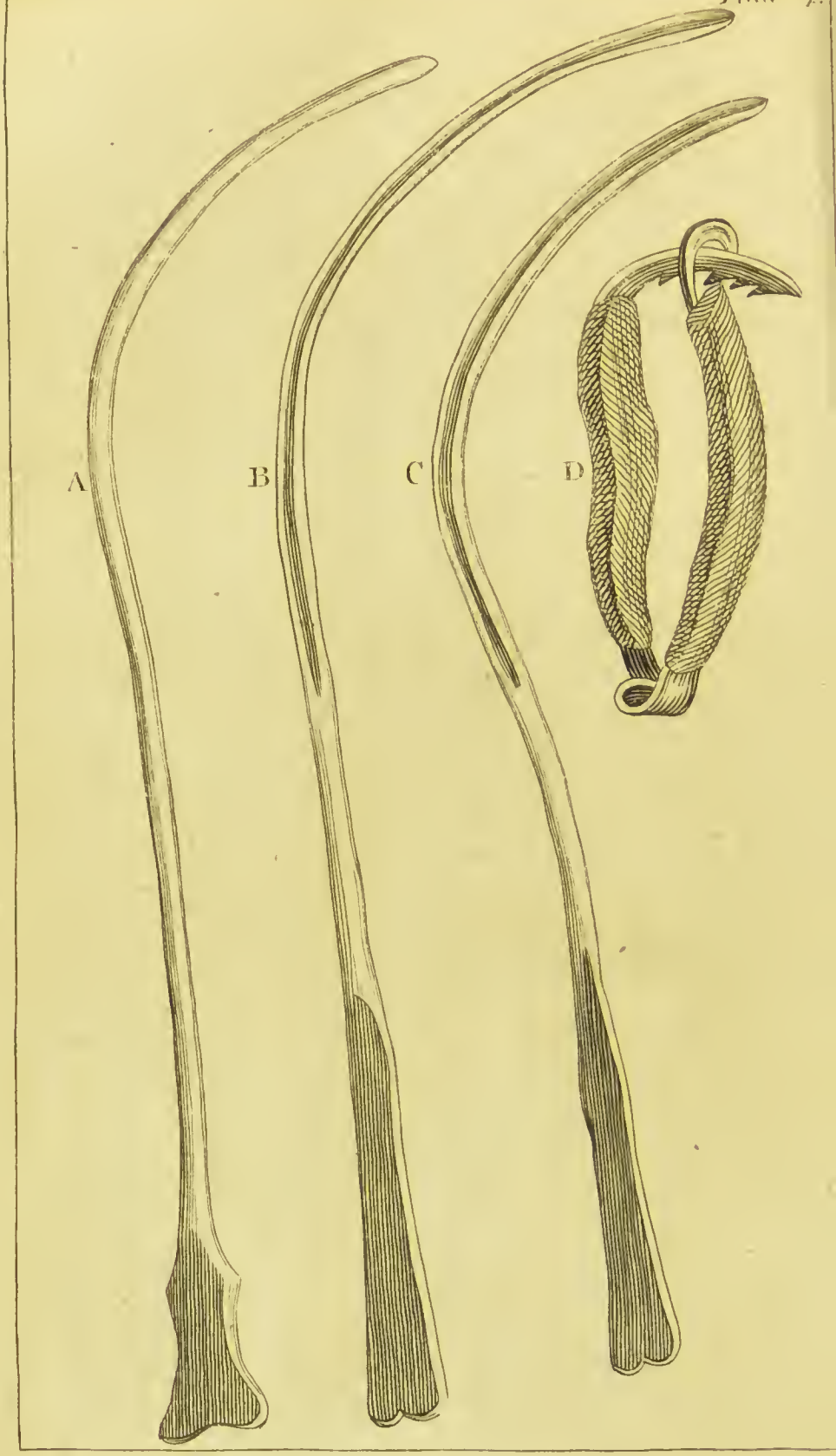
The firſt good ſymptom after the operation, is the urine coming freely away, as we then know the lips of the bladder and proſtate gland are not much inflamed; for they often grow turgid, and ſhut up the orifice in ſuch a manner as not only to prevent the iſſue of the water, but even the introduction of the finger, or female catheter, ſo that ſometimes we are forced to paſs a catheter by the penis. From this ſymptom too we learn, that the kidneys are not ſo affected by the operation as to ceaſe doing their office, which, though a very rare circumſtance, may poſſibly occur. If the patient ſhould become languid, and continue without any appetite, bliſters prove beneficial, which may be applied with great ſafety, and little pain, as there is ſeldom or never any ſtrangury. About the third or fourth day a ſtool muſt be procured by a clyſter, for it ſeldom comes naturally the firſt time, and this method muſt be continued as every man's diſcretion ſhall guide him. As ſoon as the patient comes to an appetite, he ſhould be indulged in eating light food, with this caution, that he do not eat too much at a time: it ſometimes happens that a fortnight or three weeks after the operation, one or both teſticles indurate and inflame, which diſorder may generally be removed by fomentations and diſcutient applications; or if a ſuppuration enſue, which however is very ſeldom the caſe, the abſceſs is not very difficult to cure.

If during the cure the buttocks ſhould be excoriated by the urine, let them be anointed with nutritum; the dreſſing from firſt to laſt, is ſeldom any other than a ſoft digeſtive, or dry lint; for the whole art of healing the wound conſiſts in the force with which the doſſil is applied; if it be crammed in hard, it becomes a tent, and prevents the growth of the little tender ſhoots of fleſh, till in proceſs of time, from the continual diſtenſion, and long drain of the urine, the whole cavity becomes callous, and forms itſelf into a fiſtula: on the other hand, if the wound be dreſſed quite ſuperficially, the external parts of it, being more prone to heal and contract than the internal, the conſequence will be a degree of obſtruction to the urine and matter, which lying about the wound of the bladder, for want of a diſcharge, will indurate the part, and likewiſe occaſion a fiſtula. This method of dreſſing is not peculiar to wounds after cutting for the ſtone, but is applicable to fiſtulas in ano, and almoſt all abſceſſes whatſoever; ſo that the branch of ſurgery, which regards the treatment of hollow wounds, depends much more on the proper obſervance of this rule, than the application of particular medicines.

CHAP. XXII.

OF THE STONE IN THE URETHRA.

IF a ſmall ſtone be lodged in the urethra near the glands, it may often be puſhed out with the fingers, or picked away with ſome inſtrument; but if it ſtops in any other part of the channel, it may be cut upon without an inconvenience: the beſt way of doing it, is to pull the prepuce over the glans, as far as you can, and then making an inciſion the length of the ſtone, through the teguments, it may be turned out with a little hook, or the point of a probe: the wound of the ſkin ſlipping back afterward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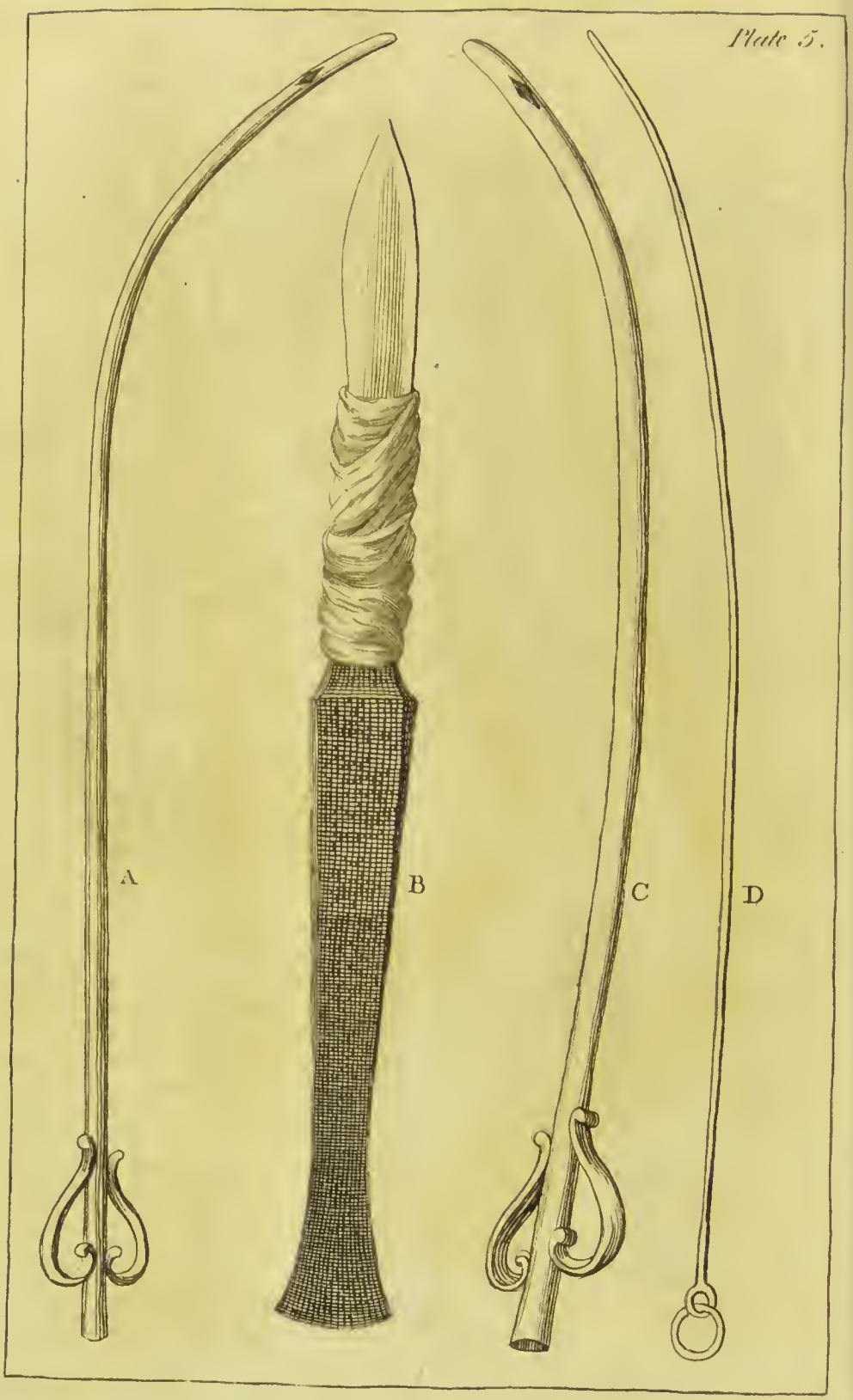
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afterward to its proper ſituation, and from the orifice of the urethra, prevents the iſſue of the urine through that orifice, and very often heals in twenty-four hours. This is a much leſs painful method of extracting ſtones from the urethra, than by any inſtruments that have hitherto been deviſed.

CHAP. XXIII.

OF THE EXTRACTION OF THE STONE IN WOMEN.

THE extraction of the ſtone in women, will be eaſily underſtood, ſince the whole operation conſiſts in the placing them in the ſame manner as men, and without making any wound, introducing into the bladder a ſtraight director, upon that a gorget, and afterwards the forceps to take hold of the ſtone; all which may be done without difficulty, by reaſon of the ſhortneſs of the urethra. If the ſtone proves very large, and in extracting draws the bladder forwards, it is adviſeable to make an inciſion through the neck of it, upon the ſtone, which not only will facilitate the extraction, but alſo be leſs dangerous than a laceration, which would neceſſarily follow. The dreſſings are fomentations and emolient ointments, which ſhould be applied two or three times a-day, and the patient in other reſpects be treated like men who have undergone the operation for the ſtone.

PLATE IV.

THE EXPLANATION.

A. A ſound uſed in ſearching for the ſtone.

The ſize repreſented here, is but a little too large for the youngeſt children, and may be uſed upon boys till they are thirteen or fourteen years of age; a larger ſhould be employed between that age and adultneſs, when one of about ten inches, in a right line from the handle to the extremity, is proper. This ſhould be made of ſteel, and its extremity be round and ſmooth.

B. A ſtaff fit for the operation on boys from eight to fourteen years of age. The ſtaff for a man muſt be of the ſize of the ſound I have already deſcribed.

C. A ſtaff ſomething too big for the ſmalleſt children, but may be uſed upon boys from about four years of age to eight.

The ſtaff has a groove on its convex ſide, which firſt ſerves as a direction where to cut, and afterwards receiving the beak of the gorget, guides it readily into the bladder. Care ſhould be taken in making the groove, that the edges of it be ſmoothed down, ſo that they cannot wound in paſſing through the urethra. The extremity ſhould alſo be open, otherwiſe it will be ſometimes difficult to withdraw the ſtaff, when the gorget is introduced, and preſſes againſt the end of it.

Theſe inſtruments are uſually made with a greater bending than I have here repreſented; but I think this ſhape more like that of the urethra, and rather more advantageous for making the inciſion.

D. The yoke, an inſtrument to be worn by men with an incontinence of urine: it is made with iron, but for uſe muſt be covered with velvet: it moves upon a joint at one end, and is faſtened at the other by catches, at different diſtances placed on a ſpring, as will be eaſily underſtood by the annexed print. It muſt be accommodated to the ſize of the penis, and be taken off whenever the patient finds an inclination to make water. This inſtrument is exceedingly uſeful, becauſe it always anſwers the purpoſe, and ſeldom galls the part after a few days wearing.

PLATE V.

THE EXPLANATION.

A. A ſmall catheter made of ſilver. This inſtrument is hollow, and ſerves

to draw off the urine when under a suppression; it is also used in the high operation to fill the bladder with water; near its extremity are two orifices, through which the water passes into its cavity. Care should be taken that the edges of these orifices are quite smooth.

B. The knife used in cutting for the stone. It is the same I have already described; but I thought it might not be improper to repeat the figure with the alteration of a quantity of tow twisted round it, which makes it easier to hold when we perform the lateral operation, and turn the edge upwards to wound the prostate gland.

C. A female catheter, different from the male catheter, it being almost straight, and something larger.

D. A silver wire to pass into either catheter, for removing any grumous blood or matter that clogs them up.

PLATE VI.

THE EXPLANATION.

A. The gorget used upon men in the lateral operation.

B. The gorget used upon children under five years of age, in the lateral operation.

A gorget between the sizes of these two, will be fit for boys from five years of age to fifteen or sixteen.

These instruments are hollow for the passage of the forceps into the bladder, and their handles lie slanting, that they may the more readily be carried through the wound of the prostate, which is made obliquely on the left side of it. The beak at the extremity of the gorget, must be smaller than the groove of the staff which is cut upon, because it is to be received in the groove. Care should be taken that the edges of the gorget near the beak are not sharp, lest, instead of dilating the wound, as it ought, it should only cut on each side when introduced; in which case, it would be difficult to carry the forceps into the bladder.

C. A gorget, with its handle exactly in the middle; this shaped instrument is used in the old way. All the gorgets should be made of steel.

PLATE VII.

THE EXPLANATION.

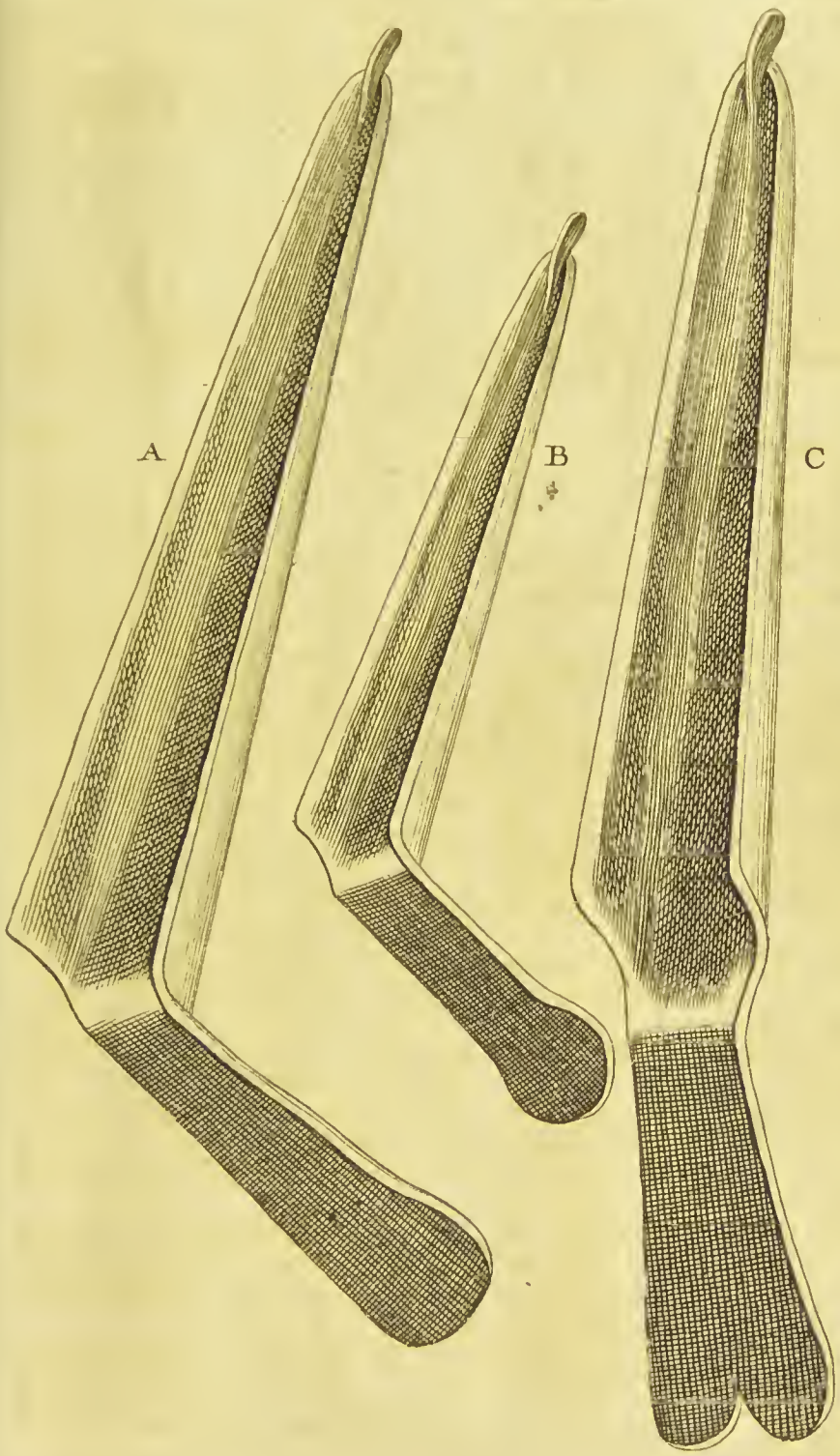
A. The forceps for extracting the stone. These are represented a little open, that the teeth may be better seen within-side.

This instrument must be of different sizes for different ages and stones, from the length of that in the copperplate, to one of near a foot long; but the forceps of about eight inches long will be found most generally useful. The number necessary to be furnished with, will be four or five.

Great care should be taken by the makers of this instrument, that it move easily upon the rivet, that the extremity of the chops do not meet when they are shut, and particularly that the teeth be not too large, lest in entering deep into the stone they should break it: it is of consequence also that the teeth do not reach farther towards the joint than I have here represented, because a small stone, when received into that part, being held fast there, would dilate the forceps excessively, and make the extraction difficult; on which account, the inside of the blades near the joint should be smooth, that the stone may slip towards the teeth.

B. A director made of steel, used for the direction of the gorget, in the extraction of the stone from women.

C. A scoop to take away the stone when it is broken into small pieces like sand. This instrument is made of steel.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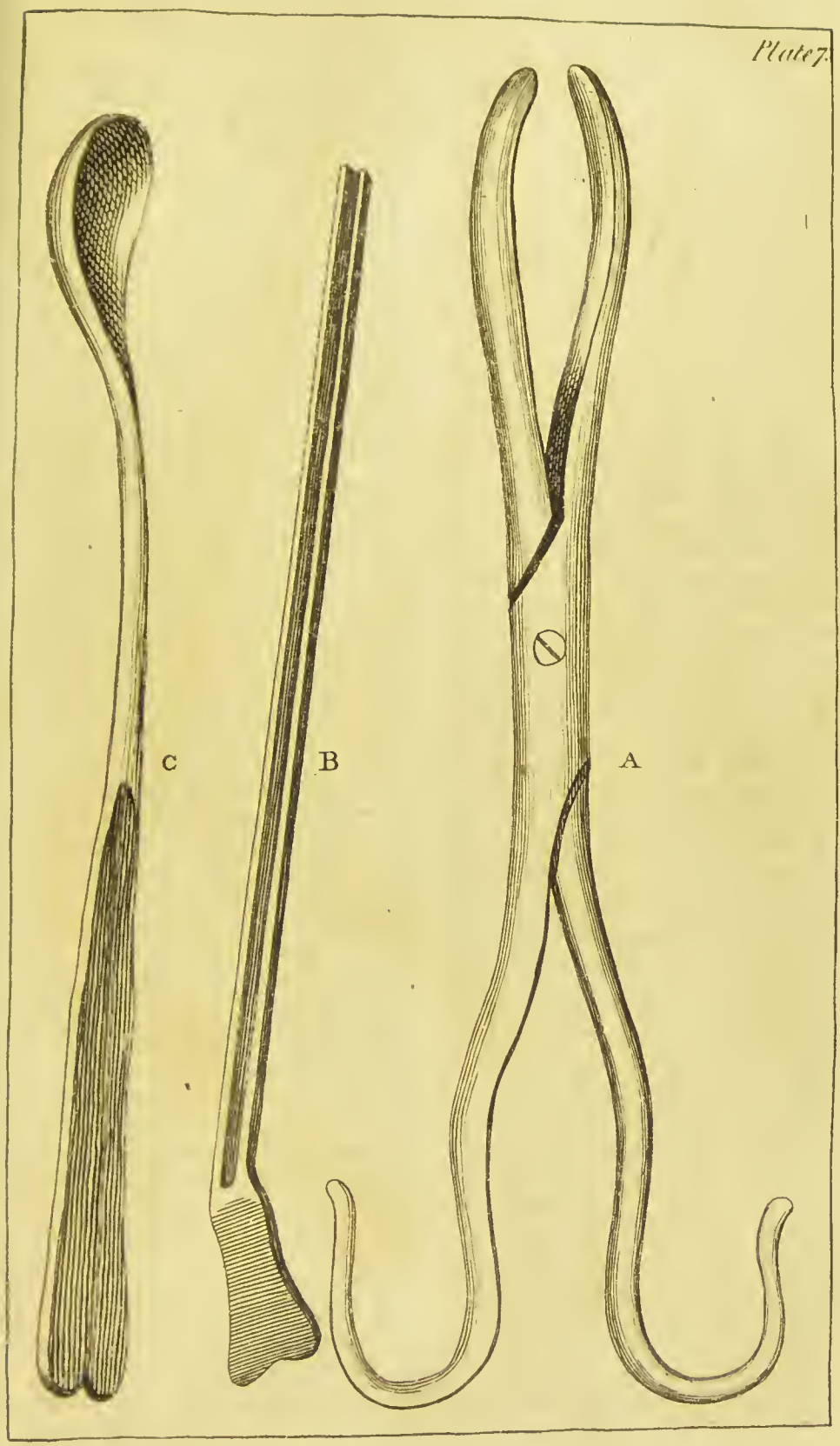
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CHAP. XXIV.

OF THE EMPYEMA.

THE operation for the empyema generally implies an artificial opening made into the cavity of the thorax, by which we evacuate any fluid that lies there extravasated, and is become dangerous by its weight and quantity. The fluids described as necessary to be voided by this operation, are blood, matter, and water.

When blood is the fluid supposed to require evacuation by this method, it is always extravasated through some wound of the vessels of the lungs or thorax, and being discharged in great quantities on the diaphragm, it is said to oppress respiration till let out by some convenient opening, made in the most depending part of that cavity, which is the only kind of perforation into the thorax distinguished by the name of the operation for the empyema: But though this opening is universally recommended in the case here stated, yet we meet with few or no examples where it has been practised for a mere extravasation of blood; and I should think it can hardly ever be adviseable on this account: for if we perform it immediately after the accident, and during the hæmorrhage, the opening made at the bottom of the thorax might probably make way for a dangerous effusion of blood, which perhaps would otherwise be choaked up and stopped for want of a ready issue: and if we wait till the hæmorrhage ceases, it becomes needless, because the blood not only for the most part finds some vent by the external wound, if left open, but is constantly spit up the trachea; so that had we no farther proofs of this absorbent power in the lungs, we might from hence be persuaded of the probability of its being more safely carried off so, than by any artificial opening we can possibly contrive in the thorax.

Or if it be thought that the extravasated blood, being coagulated in the thorax, cannot be taken up by the vessels of the lungs, yet even in that case, the operation usually practised will not answer the purpose; for besides the possibility of the lungs adhering to the pleura in the place of incision, which would absolutely prevent any advantage from it, the depth and narrowness of the orifice, and its height above the diaphragm, on which the congealed blood is supposed to lie, will make the success at best but very precarious.

To empty the thorax, in a rupture of any vessels which open into it, bleeding is very necessary, which not only stops the hæmorrhage, by abating the force of the circulation, but likewise, by unloading the vessels of their contents, makes them more fit to receive the extravasated fluid by absorption; gentle evacuations and pectorals, are also very serviceable, and a low diet is absolutely necessary.

The rules laid down in some books for distinguishing if a wound penetrates, have led practitioners into mischievous methods, by advising them to examine these wounds with the probe, or for more certainty the finger; which, if rudely used, sometimes even tear into the thorax, always force or press the parts too much, and often separate the lungs from the pleura, when they happen to adhere; all which violences will produce abscesses there, especially if the part be afterwards dressed with large tents, or filled with any active injection, both which were formerly applied with a view to deterge the cavity of the wound, but now seem to be exploded in favour of more superficial dressings, the advantages of which method, in my opinion, cannot be too much inculcated.

But what I have here advanced concerning the excellence of superficial application, without dilating the wound to make way for the issue of the blood or succeeding matter, must be considered with regard to punctures or incisions by sharp instruments,

ments, not followed with a great discharge; for where the wound is made with fire-arms, the method of practice must be sometimes altered; because not only sloughs and great suppurations ensue, but very often pieces of the shirt or coat are carried in with the bullet, which will perhaps require an enlargement of the wound, in order to be freely discharged; though even upon this account, there will be no occasion to make an opening at the bottom of the thorax, since the more dilatation of the wound will more readily give vent to the pus and extraneous bodies, than an orifice made lower; because the lungs being inflamed by the wound, will generally adhere to the pleura, and break off the communication between the abscess and the cavity below it. In dressing the dilated wound, care must be taken to apply the dossils with such pressure only, as shall be sufficient to keep open the external orifice; and not to croud them into the thorax, so as to lock up that matter, which the very design of dilation is to give a discharge to.

The second circumstance in which this operation takes place, is a rupture of matter from the pleura, mediastinum, or lungs, into the cavity of the thorax, where accumulating, it at length proves fatal for want of a discharge. It is true that the case occurs but very seldom, where the operation is necessary; because in most abscesses of the thorax, the matter is spit up as fast as it is generated, and in the dissection of such who have died of this species of consumption, we rarely find much extravasated pus in the cavity, though a great portion of the lungs be destroyed: however, as I have intimated, there are a few examples which require the operation, and they may be distinguished by the following symptoms: the patient is obliged to lie upon the diseased side, or in case there is matter in both cavities of the thorax, on his back; because the mediastinum can seldom support the weight of the incumbent fluid, without suffering great pain: but this rule is not certain; it sometimes happening that the patient can lie with ease on that side where there is no fluid. Another symptom of extravasated matter, is an evident undulation of it, so that in certain motions it may be heard to quash. For the most part too, upon careful enquiry, an œdema, or at least a thickening of some portion of the intercostal muscles, will be discovered. And lastly, if there be much fluid, it will be attended with a preternatural expansion of that side of the chest where it lies. When, therefore, these signs appear after a previous pleuritic or pulmonary disorder, and the case has been attended with the symptoms of a suppuration, it is most probably owing to a collection of matter; though the patient will also labour under a continual low fever, and a particular anxiety from the load of fluid.

I have here described the abscess as breaking into the cavity of the thorax; but generally speaking, in an inflammation of the pleura or lungs, an adhesion of both ensues; in consequence of which, nature finds a discharge outwardly, it being most frequent for abscesses of the pleura and intercostal muscles, and not uncommon even for abscesses of the lungs, to break externally. In case of an adhesion, no farther operation is required than opening the tumour, when suppurated, with a lancet; and if the discharge be so great as to forbid the healing the external ulcer, it may be kept open with a hollow tent; by which manner of treatment many have lived a long time with a running fistula.

The last sort of fluid said to require issue from this operation, is water, which however very seldom collects in such a manner as to become the proper subject of the operation; for if the dropsy of the thorax be complicated with an anasarca, or even ascites, it is certainly improper, and indeed it can hardly ever take place but where the distemper is single, and takes

takes its rise from the same sort of disorder in the lymphatics of the pleura, as the hydrocele does from those of the tunica vaginalis. The symptoms of this dropsy are, a small cough without spitting, a little slow fever from the disturbance of respiration; sometimes too the water by a sudden jerk may be heard to quash, and generally speaking, its weight upon the diaphragm and mediastinum are so troublesome as to oblige the patient to stoop forward when in an erect posture, and to turn upon the affected side when he lies down; for the same reason, when there is water in both cavities of the thorax, he is forced to lie on his back.

The manner of operating, whether it be for the discharge of matter or water, is to pitch upon the most depending part of the thorax, which some have supposed to be between the eighth and ninth rib, and others between the ninth and tenth, at such a distance from the vertebræ that the depth of the flesh may not be an impediment to the perforation; this distance is determined to be about a hand's breadth; and here, with a knife, scissars, or trocar, we are ordered to make the perforation; but in doing it, there are a great many difficulties: in fat persons, it is not easy to count the ribs, and the wound will be very deep, and troublesome to make: it is hardly possible to escape wounding the intercostal artery, which runs in this place between the ribs; or if you avoid it by cutting close to one of the ribs, a caries of the bone will follow from the pressure of the tent employed afterwards: again, the inflammation of the wound may possibly affect the diaphragm, which is supposed almost contiguous to it, and this may prove of very ill consequence; so that, upon the whole, without any farther recital of objections to the empyema thus performed, it cannot appear an adviseable operation. But if the only advantage proposed by this situation of the wound be derived from its dependency, the purpose of discharging the fluid will be as well answered, by an opening between the sixth and seventh rib, half way from the sternum towards the spine; which, by laying ourselves down, becomes in effect as depending an orifice as the other in sitting up; and by an opening made in this manner, we avoid all the inconveniencies in the other method: for in this part of the thorax, there is very little depth of muscles; the artery lies concealed under the rib; and the diaphragm is at a great distance; so that none of those mischiefs can ensue I have supposed in the other method; which consequently will give it the preference. The opening is best made with a knife, and should be about an inch long through the skin, and half an inch through the subjacent muscles: though, to make the incision with less risk of wounding the lungs, it may be adviseable to dilate it with the blunt-pointed knife (as is practised in the operation for the bubonocele) after having made a small puncture with a common knife. If it should be objected, that the fluid cannot be discharged by this orifice while we are erect, whereas, by making it in the lower part of the thorax, it will be continually draining; I think it may be answered, that after it is once emptied, it will hardly in twelve hours be generated in greater quantity than what will lie upon the diaphragm below the opening made even by that operation, and consequently cannot be more readily discharged by one orifice than the other. The treatment of the wound will be according to the nature of the discharge. If after a few days there appears no drain, you may let the orifice heal up; but if it continues, it may be kept open with a short silver canula, till such time as an alteration in that circumstance will give us leave to cicatrize with safety.

CHAP. XXV.

OF ENCYSTED TUMOURS.

THESE tumours borrow their names from a cyst, or bag, in which they are contained; and are farther distinguished by the nature of their contents: if the matter forming them resembles milk curds, the tumour is called *Atheroma*; if it be like honey, *Meliceris*; and if composed of fat, or a suetty substance, *Steatoma*. The two first are not readily distinguished from one another, but their difference from the steatoma is easily learnt by their softness and fluctuation. These tumours appear in every part of the body, and in places where there are no glands; which, with the circumstances of their composition continuing always the same from their first formation, agrees but little with an opinion some of the moderns are so fond of, that this kind of swelling is an obstructed gland; whose membrane forms the cyst, and whose fluids, when they burst out of their vessels after a long obstruction, make the matter contained.

The steatoma is never painful till by its weight it grows troublesome, nor is it a mark of general indisposition of body; so that the extirpation seldom fails of success. The size of some of them is very large, frequently weighing five or six pounds, and there have been instances of their weighing above forty.

When the steatoma is irregular in its surface, with eminences and depressions, it is suetty; whereas the fat one has for the most part a uniform smooth outside. The operation for a steatoma will be understood by the description of that for the schirrhus.

The atheroma is much more common than the meliceris, at least, if all encysted tumours with matter not curdled, may, in compliance with custom, be called so:—these are more frequent, and grow larger than those where the matter is curdled, being often attendant on scrophulous indispositions, which makes them more difficult of cure.

The cysts of these tumours, with the skin covering them, after a certain period of growth, resisting any farther enlargement, do frequently inflame and break; but this opening is not so advantageous to the cure, as extirpation by the knife, which should be done in the infancy of the swelling. When the tumours are no bigger than a small golden pippin, they may be dissected away from under the skin, by making a straight incision only through it; but if they exceed this bulk, an oval piece of skin must be cut through first, to make room for the management of the knife, and taking away the tumour; in which case, it will be adviseable to take off the upper portion of the cyst with the skin; and then by the help of a hook to dissect away as much of the remainder of it as can be conveniently, which is a less painful, and more secure method than destroying it afterwards with escharotics. This rule is to be observed, when the cyst runs so deep amongst the interstices of the muscles as to make it impossible to remove the whole of it, where, if we cut off a great quantity, the rest usually comes away in sloughs and matter. I once opened a remarkable atheroma of this kind; it was about as big as the crown of a man's hat, and lay underneath the pectoral muscle (as all I ever met with on the breast have done) extending itself towards the arm-pit, amongst the great vessels, and resting against the clavicle: I cut away a large circular piece of the skin, pectoral muscle, and cyst, but did not dare to touch the lower part of it, which I could not remove without laying the ribs bare; however it separated in the digestion of the wound, which for some time discharged excessively, and the whole cavity filled up, leaving him the use of his arm almost perfect: after this, two or three small splinters of the clavicle worked away through the skin, but without any great inconvenience.

The

The ganglion of the tendon is an encysted tumour of the meliceris kind, but its fluid is generally like the white of an egg; when it is small, it sometimes disperses of itself; pressure and sudden blows do also remove it, but for the most part it continues, unless it be extirpated: it is no uncommon case to meet with this species of ganglion running under the ligamentum carpale, and extending itself both up the wrist and down to the palm of the hand. The cure of this disorder cannot be effected but by incision through its whole length, and dividing the ligamentum carpale, which I have performed successfully several times.

The dressing in these cases does not at all differ from the general methods of treating wounds.

CHAP. XXVI.

OF THE AMPUTATION OF THE CANCERED AND SCHIRRHOUS BREAST.

THE success of this operation is exceedingly precarious, from the great disposition there is in the constitution, after an amputation, to form a new cancer in the wound, or some other part of the body. When a schirrhus has admitted of a long delay before the operation, the patient seems to have a better prospect of cure without danger of a relapse, than when it has increased very fast, and with acute pain. I cannot, however, be quite positive in this judgment, but upon looking round among those I know who have recovered, find the observation, so far, well grounded. There are some surgeons so disheartened by the ill success of this operation, that they decry it in every case, and even recommend certain death to their patients, rather than a trial; upon the supposition it never relieves; but the instances, where life and health have been preserved by it, are sufficiently numerous to warrant the recommendation of it.

The scirrhus may be distinguished by its want of inflammation in the skin, its smoothness and slippiness deep in the breast, and generally by its pricking pain, which, as it is more or less, increases the danger accordingly; though there are some few with little or none in the beginning.

As the tumour degenerates into a cancer (which is the worst degree of scirrhus) it becomes unequal and livid, and, the vessels growing varicous, at last ulcerates.

In extirpating the scirrhus, if it be small, a longitudinal incision will dilate sufficiently for the operation; but if too large to be dissected out in that manner, an oval piece of skin must be cut through first, the size of which is to be proportioned to that of the tumour; for example, if the swelling is five inches long, and three broad, the oval piece of skin cut away must be nearly of the same length, and about an inch and a half in breadth. In taking off the whole breast, the skin may be very much preserved, by making the wound of it a great deal less than the basis of the breast, which must be carefully cleared away from the pectoral muscle: this is not difficult to do, because all these scirrhuses being enlarged glands, are encompassed with their proper membranes, which make them quite distinct from the neighbouring parts, and easily separable; at least this is the case when the tumour is moveable; for sometimes it adheres to the subjacent muscle, and that muscle to the ribs; in which circumstance the operation is impracticable. When it is attended with knots in the arm-pit, no service can be done by amputation, unless the knots be taken away; for there is no sort of dependence to be laid on their subsiding, by the discharge of the wound of the breast; the possibility of extirpating these knots, without wounding the great vessels, is very much questioned by surgeons; but I have often done it

 above

when they have been loose and distinct.

The bleeding of the large arteries is to be stopped by passing the needle twice through the flesh, almost round every vessel, and tying upon it, which will necessarily include it in the ligature. In order to discover the orifice of the vessels, the wound must be cleaned with a sponge wrung out of warm water.

The scirrhous tumours which appear about the lower jaw, are, generally speaking, scrophulous disorders, that distinguish themselves almost by the circumstance of fixing on the salivary glands. These are very stubborn of cure, but not so bad as the scirrhus, since they frequently suppurate, and heal afterwards; if they impostumate again after healing, it is for want of a good bottom, which may sometimes be procured by destroying their bad surface with a caustic. Besides these, there is another species of scirrhus in the neck, that succeeds better after extirpation than either of the former kinds; this is an enlargement of the lymphatic glands, which run close up by the jugular vein, and is distinguishable from cancers of this part by its moveableness, want of pain, the laxness of the skin covering it, the small degree of pressure it makes on the œsophagus and trachea; and lastly, the good habit of body, as it seldom affects the constitution, which cancers here do very early after their first appearance. This tumour, from its situation, requires great exactness in the cutting off: the last I took away of this kind, I separated from the jugular vein near the length of an inch and a half: they sometimes extend up to the chin towards the mouth, and occasion a division of the salivary duct in operating, which proves very troublesome to heal, but when all other methods have failed, may be cured by a perforation into the mouth, through that part of the cheek where it is wounded, which, by a tent or small seton, may be made fistulous; then by properly dressing upon the outside, the oozing of the saliva that way will be prevented, and the external orifice healed without difficulty.

The treatment of all these wounds may be made with dry lint first, and afterwards as in the common incised wounds.

CHAP. XXVII.

OF THE OPERATION OF THE TREPAN.

THE operation of the trepan is the making one or more orifices through the scull, to admit an instrument for raising any pieces of bone, that by violence are beaten inwards upon the brain; or to give issue to blood or matter, lodged in any part within the cranium.

Fractures of the scull are at all times very dangerous, not in consequence of the injury done to the cranium itself, but as the brain becomes affected, either from the pressure of the fractured bone, or that of the extravasated blood and matter.—If then the symptoms excited by a fracture do sometimes follow from a mere extravasation of blood, as is the case when the cranium is not beaten inwards, it must likewise happen that a rupture of the vessels of this part without a fracture, will also occasion the same disorders: for this reason, the operation may take place, where the scull is not much offended, but only the vessels of the dura mater, the pia mater, or the brain.

The writers on this operation have described the different disorders in which it is useful, under a great variety of names; but those few general ones, which all surgeons are acquainted with, are quite sufficient for the understanding the nature of every case that can happen.

When

When the cranium is beaten inward, without any fracture, it is called a depreſſion; when very much broken, a fracture; or if broken and beaten in alſo, a fracture with depreſſion, if it is only cracked without depreſſion, though properly a fracture, it is called a fiſſure; if none of theſe diſorders appear, where there is a ſuſpicion of them, the ſymptoms are imputed to a concuſſion of the brain. Theſe are the four diſtinctions in uſe, and which fully comprehend all the others.

The depreſſion of the cranium without a fracture can but ſeldom occur, and then it happens to children whoſe bones are more pliable and ſoft than thoſe of adults: I have met with one inſtance of this myſelf in a girl of ſeven years of age: when ſhe firſt received the injury; ſhe had the complaints of an oppreſſed brain, but they ſoon went off; the blow formed a large tumour on the parietal bone, for which ſhe was put under my care ſome days after the accident; I opened immediately into it, by cutting away a circular piece of the ſcalp, and took out a great quantity of grumous blood lying underneath the perioſteum; I then dreſſed the depreſſion with dry lint, and finding no complaints come on, continued the ſame method, till in about ſix weeks ſhe was perfectly cured.

In blows of the cranium, requiring the uſe of the trepan, the marks of a fracture are generally very evident, ſince the ſcalp is often lacerated ſo much as to expoſe it to our ſight: but if the wound of the ſcalp be ſo ſmall as only to admit a probe, we muſt judge then by the feel of the ſurface of the bone, uſing the caution of not miſtaking a ſuture for a fracture, which Hippocrates confeſſes he himſelf did; though for this frank confeſſion of an error, to prevent others being miſled, he is as much recommended to poſterity as for any of his other qualities.

If there be no wound of the ſcalp, you muſt preſs about the head with your fingers, till the patient complains of ſome particular part, which in all likelihood is the place affected, and if the ſcalp there be ſeparated from the cranium, is almoſt infallibly ſo: the ſymptoms of a fracture are, a bleeding at the ears and noſe, a loſs of ſenſe, vomitings, drowſineſs, delirium, incontinence of urine and excrement; but what is moſt to be depended upon, is a depreſſion of the bone, or a roughneſs on its outſide; for all the other complaints not only happen to concuſſions, which do well without the application of a trepan, but likewiſe there are fractures not attended with any of them, or at leaſt in a ſlight degree; ſo that theſe ſymptoms alone, without examination of that part affected, are but an uncertain rule to go by.

In concuſſions without a fracture, that produce the ſymptoms here laid down, and do well afterwards, the veſſels of the brain and membranes are only inflamed and dilated: or if they are ruptured, they abſorb the extravaſated blood again; on which account, nature ſhould be aſſiſted by plentiful bleedings, clyſters, and other evacuations, and ſo in all fractures where the patient is not trepanned immediately; however, although people with concuſſions in the violent degree I have ſtated, do ſometimes recover, it is ſo very ſeldom, that there can be no pretence, when they happen, for neglecting the trepan, but not being able to learn in what part the concuſſion is. The opportunities I have had of opening ſome people who have died under this circumſtance, have ſufficiently convinced me how little is to be truſted to any other method than an opening for the diſcharge of the abſceſs, which by confinement of matter becomes very large, ſpreading over a great quantity of the brain before it kills.

Writers diſpute very much about the poſſibility of the contra fiſſure, or a fiſſure occaſioned on the part of the head oppoſite to that on which the blow is given, or where the inner table is fractured, while the outer one remains entire: but there are hiſtories of

of cases, which, if fairly stated, make it unquestionable; and this is most certain, that if the complaint be at a distance from where the blow was received, there can be no danger in scalping, and applying the trepan to that part where the pain is.

There are surgeons who say that the vessels of the diploe do sometimes, by a concussion, break, and that the matter making its way through the inner table of the scull into the brain, requires a trepan; but I believe there is no very good authority for this assertion.

When we are assured of a fracture or depression, though the symptoms in a great measure go off, and notwithstanding there are a few histories in authors, where we read that patients have survived without the operation, it is, in my opinion, always adviseable to trepan as soon as possible, in order to prevent the spreading of the abscess, which seldom fails to follow upon the rupture of the vessels of the brain and membranes, and for the most part in a few days; though there are a great many instances of fractures not bringing on a fatal abscess for a great length of time after the accident.

I once trepanned a young woman about a hundred days after she received the blow; the lower part of the parietal, and upper part of the temporal bones, were fractured and depressed; she bled at the nose and ears when she first received the injury, and had at times been drowsy, and in some little pain, till towards the ninetieth day, when the symptoms of a compressed brain came on stronger, and a small time after she put herself under my care; which, with the many instances of the same kind to be met with in authors, shew how little safe it is to trust to any extravasation or depression on the brain doing well, without the assistance of the trepan.

The manner of treating a fracture of the cranium, will be according to the nature of the fracture itself, and the injury of the scalp; if the wound of the head be torn into angles, perhaps cutting off the lacerated flaps will make room for the saw; if the bone be broken into several pieces, the pieces may be taken away with the forceps; or if some of the scull be also depressed, the removal of the pieces will, without perforating, make way for the elevator to raise the depressed part; but if the fracture be not complicated with a wound of the scalp, or the wound be too small to admit of the operation, which seldom fails to be the case, then the fracture must be laid bare, by taking away a large piece of the scalp. It is a fashion with some surgeons, to make a crucial incision for this purpose, which they prefer to the other method, upon the supposition that the wound will more easily heal again after the operation, by turning down the flaps; and in case we find no fracture, which sometimes happens after scalping, that by making this species of wound, an exfoliation of the bone, and tediousness of cure, will be avoided. But whoever has seen the practice of the crucial incision, must be sensible of the false reasoning used in its favour; for it seldom happens that we enquire for the fracture of a scull by scalping, but that the scalp itself is contused, which circumstance generally bringing on a plentiful suppuration, and the matter lodging between the cranium and skin, not only prevent their immediate healing, but occasion a caries of the bone, which is the accident meant to be shunned by it; and often at last, the lips of the wound growing callous, require cutting off, to procure a cicatrix. If then the objection be good to the crucial incision, when no operation is performed, it becomes of so much more force when we are assured of using the trepan, that I think it is indisputably right at all times to take off the scalp when we lay bare the cranium with a view to the operation, which seldom fails to granulate with flesh in a few days, if dressed only with dry lint, and rarely grows

grows carious, if not affected by a great discharge of matter from the brain, and even in that case but superficially; or if, after it is thus exposed, new flesh should not generate upon its surface, the growth of it may be quickened by boring little orifices into the substance of the bone, or rasping it with the rugine. The form of the piece taken away may be nearly circular; and to be better assured of the course of the fracture, it will be proper it should be of the whole length of it. I believe there are few will care to expose so much naked scull, but whoever knows the great advantage and the little danger of it, will not hesitate. When the scalp is removed, the periosteum must be raised, and the arteries immediately tied, which will make way for the operation to be directly performed, though the effusion of blood has been esteemed so troublesome in this part, as to have made it almost an universal practice to postpone the use of the trepan to the day after; but the apprehension is without foundation; for if two or three of the larger vessels are tied, the others may easily be stopped with a little dry lint, and the operation take place without any inconvenience, which I have always done myself, and would recommend to others, considering how urgent the nature of the distemper is, and that less than twenty-four hours is often the difference between life and death, when the brain is much pressed by a fractured bone.

Before the application of the trepan, it is to be remembered there are certain places on the scull, where it cannot be used with so much safety as on others; the whole length of the sagittal suture, down to the nose, is always mentioned as one where the perforation is dangerous, because of the spine of the os frontis, and the course of the superior longitudinal sinus under this part, which it is supposed would be necessarily wounded by the saw, and in consequence destroy the patient by the hæmorrhage; but though a perforation may, contrary to the general opinion, be made over the sinus without offending it; and even if it was wounded, the effusion of blood would not in all probability be mortal (as I have seen in two instances) yet at best it would be troublesome; and since we are not straightened in that part of the cranium for room, I think it is adviseable to forbear operating in this place. The bony sinuses of the os frontis forbid the use of the trepan near the orbits of the eyes; therefore if it should be depressed near those cavities, the surgeon must be careful to perforate either above or one side of the fracture; for sawing below it, will only lead into the sinus, and answer no purpose in the design either of giving a discharge to the matter from the brain, or an opportunity to elevate the depression; nay, perhaps leave an incurable fistula, if the patient escapes with life.

The os occipitis being very uneven, both in its internal and external surface, makes trepanning there almost impracticable; besides, the great sinuses run about so much of it, as hardly to afford space to perforate without danger of wounding them; but then it is so defended from injuries by its situation and strength, that fractures do not happen to it so often as to the other bones of the cranium; and when they do, for the most part they become soon mortal, by affecting the cerebellum, which it sustains, that the operation is seldom required in this case. Indeed the upper angle of this bone lies above the cerebellum, and when fractured or depressed, is not attended with so immediate danger; but when this happens, the course of the longitudinal sinus down the middle of it, and the neighbourhood of the lateral sinuses beneath it, make it adviseable to trepan at the lower part of the os parietale, or at least upon or just below the lambdoidal suture, so that the perforation of the os occipitis can hardly ever be proper.

It may be observed, I have spoken of wounds of the cerebellum as proving

ing inevitably mortal when affected by a fracture; how long a patient may continue with matter on its surface, I cannot take upon me to say, but I believe there is no instance of a cure after an abscess; and as for wounds of it, they are generally almost instantaneous death; whereas sometimes great portions of the cerebrum have been carried off or destroyed without any notable inconvenience. From this great difference of danger, in affections of the cerebrum and cerebellum, has arisen the opinion, that the first is the organ of animal motion only, and the other of vital.

The places then unfit to admit the saw, are the three I have described; that is, the sagittal suture; that part of the os frontis near the orbits of the eyes; and the os occipitis. But when a fracture happens in any other part above the ear, there is no objection to the operation. When there is only a small fissure, without any depression or motion in the bone, the trepan may be applied on the fissure itself, which will more readily give vent to the blood or matter underneath, than if made at a distance. If the fissure be large, and the bone weakened or depressed, the trepan must be applied on one side of it, but so as to make it a part of the circumference of the sawed piece; if the fracture run upwards, it will be eligible always to perforate near its bottom, because the dependency of the orifice will give better issue to the matter, though the ill-grounded apprehension of the brain falling out there, has made many eminent surgeons contradict this rule in their practice. If by making one orifice, you cannot raise all the depressed part, you must make a second and a third, and continue doing so till you have reduced the whole cranium even: there is frequently occasion to repeat it twice or thrice, and it has been done twelve times, nay oftener, with success; which I mention, to shew the little danger there is, either in sawing the scull, or exposing the dura mater and brain when the pressure is taken off. Indeed the mischief of laying the brain bare is so small, compared with a concussion of it, or an abscess from pent-up matter, that those fractures of the scull, where the bone is broken into splinters the whole extent of it, and can be taken away, much more readily do well, than a simple fissure only, where the abscess cannot discharge itself freely; for which reason, though the depressed fracture may be raised by the means of one orifice, yet if it is of a considerable length, it will be almost absolutely necessary to make one or two more openings for the convenience of discharge; since, for want of this, we see abscesses increase daily in their quantity of matter and at the end of a few weeks carry off the patient. Those that are conversant in the dissection of persons dying of this disorder, will be convinced of the force of this reasoning, since they not only constantly find pus lodged on the brain, as far as the fissure extends, but all round about it, sometimes spreading over a quarter of its surface.

In concussions of the brain without a fracture of the cranium, if the trepan be applied, and vast discharges ensue, it will be also convenient to make more perforations into the abscess and the neighbourhood of the abscess, the situation of which will be easily guessed by the direction of the stream of matter. And here it is to be observed, that abscesses which ensue from a concussion, are generally more extensive and dangerous than those which accompany a fracture with depression; for in a fracture, the yielding of the bone destroys, in a great degree, the force of the striking body, and prevents any violent commotion of the brain; so that what the brain suffers, results chiefly from the pressure of the incumbent bone, and the laceration of the vessels near the fracture; whereas, when the cranium resists the shock, all or great part of the cerebrum sustains the concussion, and is often impostumated or inflamed

inflamed almost in its whole dimension, as we find upon opening those who die of this disorder.

The manner of trepanning is this: having fixed your patient's head steady, either on the bolster of a bed, or by placing him in a low chair, with the pin of your saw mark the center of the piece of bone to be taken out; then with the perforating trepan, make an orifice deep enough to receive the pin, which being fixed in it, will prevent the saw from slipping; and thus you are to continue sawing, till the impression made will preserve the steadiness without the pin, when it is to be taken away, for fear of its wounding the brain before the saw has entered through the cranium, which it would do at last, because of its projection. In working through the bone, the teeth of the saw will begin to clog by that time you arrive to the diploe, wherefore a brush must be ready to clean it every now and then, and with a pointed probe you must clear away the dust in the circle of the trepanned bone, observing, if it be deeper on one side than the other, to lean afterwards on that side where the impression is least, that the whole thickness may be sawed through at the same time. To do all this with less interruption, it will be proper to have two saws of exactly the same diameter, that an assistant may be brushing one while you operate with the other. We are advised to saw boldly, till we come to the diploe, which it is said will always distinguish itself by the bloodiness; but however, this is not a certain mark to go by; for though, where there is a diploe, it will manifest itself by its bloodiness, yet sometimes the scull is so very thin as not to admit of any; in which case, if an operator should push on his instrument in expectation of meeting with this substance, he would unwarily wound the brain.

This is not very often the case, but however often enough to put a man on his guard, and make him enquire whether the bone be loose after a little sawing, which is the only rule we go by when we have passed through the diploe, and may as well be attended to before coming at it, without any great loss of time. When it is quite sawed through, and lies loose, it may be taken with the forceps, contrived for that use; and if the lower edges of the orifice, next to the dura mater, are splintered, they may be scraped smooth with a lenticular.

These are the chief processes of the operation of the trepan: the only thing remaining to be done is, with an elevator, introduced at the orifice, to raise the depression, or broken splinters, if they cannot otherwise be laid hold of, and to draw out the grumous blood, or any other extraneous body. If the dura mater be not wounded or torn, an incision must be made through it, to give way to the blood or matter, which almost certainly lie underneath it, if the symptoms have been bad, and none has been discharged from between the cranium and dura mater; though it has been lately observed, that an abscess will sometimes be formed in the substance of the brain; and therefore, if the puncture of the dura mater does not procure an evacuation of the matter, and the symptoms of a suppuration are still urgent, it will be adviseable to make a small incision with a lancet into the brain itself.

I have used the word trepan all along for the sake of being better understood; but the instrument I recommend is a trephine, the advantages of which, as also that of a cylindrical saw, or one nearly cylindrical, are described in the explanation of the copper-plate.

With regard to the dressings of these wounds, I think it is very certain, that as the greatest part of the evil proceeds from the quantity and pressure of the matter, whatever approaches towards the nature of a tent, and increases its quantity and pressure by locking it up, must be pernicious: therefore I would exclude the use of all syndons whatever; the hasty

hasty application too, of spirits of wine, which is so commonly advised, cannot be proper, as they are not only unfit for inflammations in general, but also crisp up the vessels of the dura mater and brain, and stopping the suppuration, sometimes produce a gangrene. Since then, a close application is inconvenient, and whatever good there may be in topical medicines, it cannot for the most part be communicated to the abscess, by reason of its extent beyond the orifice, the best remedy will be dry lint only, which must be laid on loosely, to give vent to the matter, and be repeated twice a-day till the discharge is lessened, when once in twenty-four hours will be sufficient to the finishing of the cure, which will be something retarded by the exfoliations that sometimes follow this operation. The patient afterwards may wear a plate of tin upon the scar, to defend it from blows, or any accidental injury.

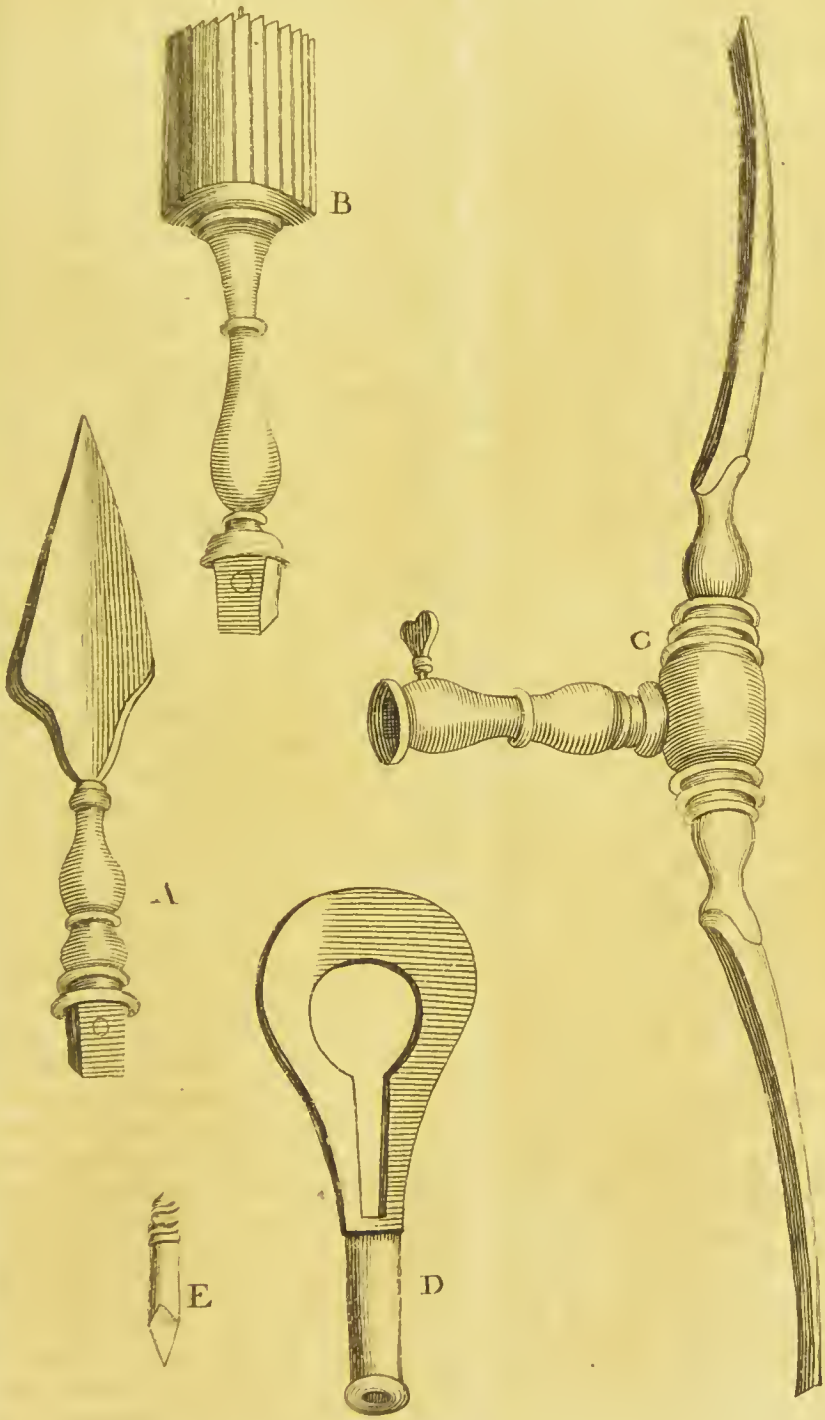
PLATE VIII.

THE EXPLANATION.

A. The perforator, commonly called the perforating trepan. With this instrument an orifice is usually made for the reception of the pin, on the center of the piece of bone that is to be taken away in the operation of trepanning; though if the pin be very sharp, and project but little beyond the teeth of the saw, as in that marked with the letter *B*, the perforator would be needless; but as the point of the pin presently grows blunt with use, and in that case it is difficult to fix the saw, I think it adviseable to have this instrument in readiness. It is also handy for boring into the substance of the bones, in order to promote a granulation of flesh on their surfaces: when it is made use of, it must be received and fastened in the handle *C*.

B. The crown, or saw of the trepan, with the pin appearing just beyond the extremities of the teeth. It may be observed, the shape of this saw is cylindrical, differing from those in use which are all conical, and some in a very great degree. Surgeons have generally conceived great advantages to arise from this form; first, as a circumstance of the utmost importance, they have imagined there would be danger of injuring the brain, by sawing too suddenly through the cranium, if the enlargement of the saw did not increase the obstruction, in proportion as they advanced towards it, and make the working of the instrument exceedingly slow. It has also been believed, that unless the saw was smaller near the teeth than towards its basis, it would be impossible to incline it on any part where it had not made so deep an impression as in others; in consequence of which, one side of the circle would be sawed through, and the membranes or brain injured; while on the other, perhaps the saw would not have penetrated through the first table of the cranium: the last remarkable argument in favour of the conic saw, is, that it more readily admits and afterwards retains the sawed piece of bone in its cavity: but I think all the advantages attributed to this figure, are almost imaginary, and the great labour of working so slowly and difficultly, is not only very inconvenient to an operator, but by no means serviceable to the operation; for notwithstanding the saw be cylindrical, and works without any other impediment than what lies before the teeth, yet even with this advantage, the operation goes on so gradually, that from the experience I have had, I do not find the least danger of suddenly passing through to the brain, as is apprehended, if we proceed with the caution of not leaning too hard on the instrument when the bone is almost sawed through; and with respect

Plate S.



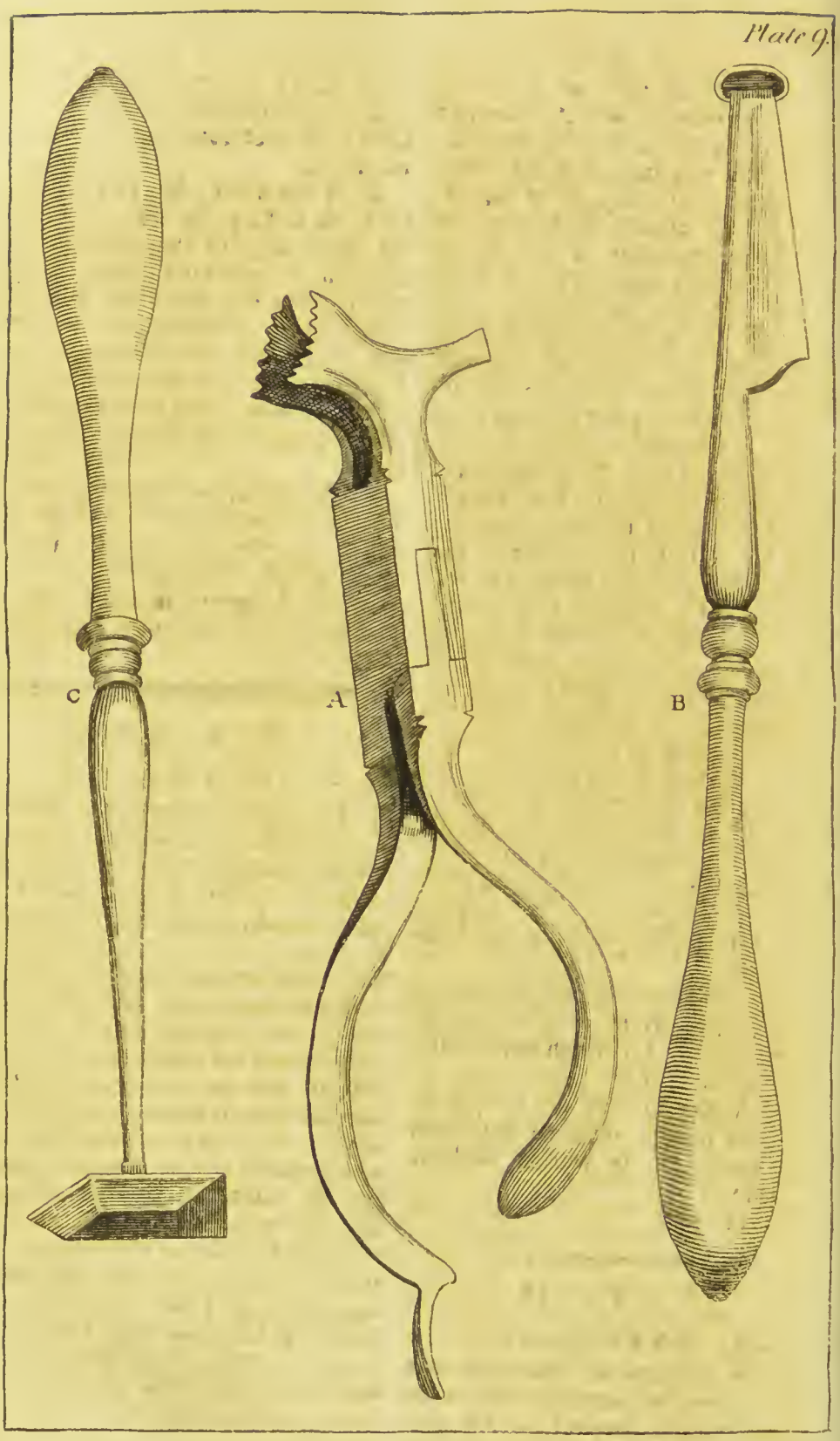


Plate 9.
C
A
B

ſpect to the impracticableneſs of inclining it on any particular part of the circle, when ſawed uneven, which is commonly alledged, whoever will try the experiment, will in a moment diſcover the falſeneſs of the aſſertion: beſides, the very inſtance ſtated, overthrows this reaſoning, for if the circle has been already made deeper in one part than another, it muſt imply that we have leaned with more force on one part than another, and conſequently may at pleaſure do the ſame thing again: as to the laſt ſuppoſed advantage, of its receiving and retaining the ſawed piece of bone in its cavity, the benefit would be ſo frivolous, if it had truly the preference of the cylindrical one in that reſpect, that it would not be worth mentioning; but in fact, the cylindrical ſaw receives the piece of bone very readily, and often retains it in its cavity.

C. The handle of the foregoing inſtrument, called the trephine, which is much preferable to the trepan (an inſtrument like a wimble uſed by joiners) becauſe of the great convenience of holding it, and leaning on one ſide or other of the ſaw, as we find it neceſſary: the trepan, however, though allowed to be unhandy, is the inſtrument moſt uſed by ſurgeons in other parts of Europe; upon the ſuppoſition of its working quicker than the trephine.

I have repreſented the trephine of ſuch a ſhape as to make it a convenient elevator, for which purpoſe the extremities of it are made rough.

D. A Key to take out the pin *E*, when the ſaw has made an impreſſion deep enough to be worked without the help of it.

E. The pin.

PLATE IX.

THE EXPLANATION.

A. A convenient forceps to take out the circular piece of bone, when it does not ſtick to the ſaw: the contrivance by which they readily lay hold of it, is to make the extremities that are to graſp it, with an arch of the ſame circle as the ſaw is made. Upon one of the handles there is added a little elevator, to lift up any ſmall ſplinter of bone, but it is not of much uſe.

B. A lenticular; the fore part of its blade is ſharp, in order to ſcrape the lower edge of the orifice of the cranium, in caſe any ſplinters ſhould remain after the operation, and the button at its extremity receives the duſt, that it may not fall on the brain; but there is ſeldom any occaſion for this inſtrument, and I have never myſelf been under the neceſſity of uſing it.

C. A rugine, or raſpatory, which I have recommended for ſcraping bones, in order to promote granulations of fleſh. The handles of theſe two laſt inſtruments are wood, whereas every part of the others ſhould be made of ſteel.

CHAP. XXVIII.

OF THE CATARACT.

THE cataract, called by the Latins *Suffuſio*, is a diſeaſe of the cryſtalline humour, rendering the whole body of it opake, ſo that the rays of light, which, in the natural ſtate of its tranſparency, were tranſmitted to the tunica retina, become now totally intercepted, and produce no effect. This is pretty nearly the account delivered down to us by Hippocrates and the ancient Greeks, who likewiſe knew it by the name of *Glaucoma*. Galen was perhaps the firſt who ſpecified any difference in defining the cataract to be a film ſituated behind the iris; and the glaucoma, a diſorder of the cryſtalline humour; which opinion, with very little alteration, has prevailed from his time down to the latter end of the ſeventeenth century, when there aroſe a diſpute on this diſtinction of Galen's, ſome of the moderns aſſerting, with Hippocrates, that the cataract is always

ways a diſeaſe of the cryſtalline humour; and indeed with ſo much reaſon, that there is now hardly any one who doubts it: however, during theſe laſt forty years, this ſubject has produced many arguments on both ſides.

Mathematicians having obſerved, in thoſe who have been couched, that the defect of ſight remaining after the operation, anſwers nearly to what in optics the removing the cryſtalline humour would occaſion, have endeavoured to prove, that the operation muſt in conſequence be the depreſſing that humour, and leaving the eye to perform its function afterwards with the aqueous and vitreous only; which wanting the denſity of that humour, will not refract the rays ſufficiently to re-unite them on the retina; whence patients, after their cure, are obliged to uſe convex glaſſes, as ſubſtitutes for the depreſſed cryſtalline humour.

Dr. Petit, a moſt accurate anatomiſt of Paris, has, from a critical examination of the figure of the eye, argued againſt the poſſibility of a film's exiſtence in the poſterior chamber, by reaſon of the ſmallneſs of that chamber, or proximity of the cryſtalline humour to the back of the iris; and again, from the impracticability of diſlodging ſuch a film, without offending the ſound cryſtalline humour.

Laſtly, and what is more certain, anatomiſts have frequently diſſected the eyes of perſons under this diſorder, after their death, and have found it to be always an opacity of the cryſtalline humour, agreeably to the definition of a glaucoma: ſo that by conſequence we muſt underſtand the words cataract and glaucoma, as ſynonymous terms, ſince they are, in fact, but one and the ſame diſeaſe.

I think it needleſs to ſtate the reaſons on the other ſide of the queſtion, as they are of little weight, and indeed almoſt univerſally exploded.

In deſcribing the nature of a cataract, it has hitherto been a poſitive maxim laid down by oculiſts of every nation, that there is one certain ſtage of the diſtemper, in which only the operation is proper; and this ſtate of the diſeaſe is ſaid to be the maturity of the cataract: they have compared it to the ripeneſs of fruits, and have ſuppoſed a regular change in the conſiſtence of the cryſtalline humour, from the moment it is affected. They ſay, the diſeaſe upon its firſt invaſion gradually liquefies the humour, and that after its arrival to the utmoſt period of liquefaction, it then begins to acquire various degrees of tenacity, till at laſt it becomes perfectly hard, or, as they ſtile it, horny: that the ſkill of the ſurgeon diſcovers itſelf by fixing on that time for the operation, in which the fluidity of the cataract is no obſtacle to the depreſſion of it, from its want of reſiſtance to the needle; nor its hardneſs, from the elaſticity of it connecting fibres, which immediately return to its former poſition.

This, in a few words, is the general doctrine; but I think the regular alteration of the denſity of the cryſtalline humour, is very much to be doubted, and for my part, I cannot help poſitively excepting to the rule here laid down, having not only ſeen cataracts of twenty or thirty years growth, often upon the touch of the needle prove ſoft and milky, but alſo many inſtances, in which a due degree of conſiſtence occurred after four or five months (I may venture to ſay days) when the cataract was the conſequence of a blow or puncture; both which caſes ſo little correſpond with this ſuppoſed change, that they ſeem not only to overthrow it, but to imply that the cataract, after it has acquired its total degree of opacity, may frequently, if not generally, continue in the ſame ſtate of tenacity to the life's end; and though I will not take upon me to affirm that cataracts come always very early to their greateſt conſiſtence, yet this we may ſafely deduce from theſe obſervations, that whenever they become entirely opake, we may properly undertake the operation;

ration; which has been my method of practice hitherto, nor do I find any reason to lay it aside.

I shall, however, observe in this place, that contrary to the received opinion, I have, upon examination, found cataracts of a proper consistence to be couched, long before they would have been opake; since it might be successful, as I have here intimated, even before that time, though I should never advise it, nor do I believe that patients would submit to it, whilst they enjoyed a certain degree of sight.

Since then, the glaucoma is no other disease than the cataract, we must at once discard the distinction of these two distempers as merely imaginary; and from what has been said with regard to the consistence of a cataract, that whatever it be, the removal of the humour is the sole end of the operation, the distinction of a true and false cataract will appear equally frivolous; and consequently most of the subdivisions comprised under this last, such as the bag, the milky, the purulent, the doubtful, the membranous, the fibrous, the shaking, and many more, in the books of this disease, the greatest part of which are names that puzzle the memory, without informing the understanding, and, indeed, have not a sufficient foundation in nature, but owe their diversity of character more to the imagination of writers, than any real variety in the disease.

The general criterion of the fitness of cataracts for the operation, is taken from their colour; the pearl-coloured, and those of the colour of burnished iron, are esteemed proper to endure the needle; the white are supposed milky, the green and yellow horny and incurable; the black cataract is described by most authors, but I dare say has been mistaken for a gutta serena, where no disease appearing, the pupil seems black as in a natural state of the eye: and as to the green one, I have not, as I remember in a great number of cataracts, met with a single instance of it, but possibly it may be in nature; and one would indeed imagine the describers of it could not be mistaken, in what must have been so evident.

The depression of a cataract of any colour, would be the cure, if that alone was the distemper of the eye; but it generally happens that the yellow cataracts adhere to the iris so firmly, as to become immoveable; besides, when they follow in consequence of a blow, which is often the case, either the cells of the vitreous humour are so much disturbed and broken, or the retina affected, that a degree of blindness will remain, though the cataract be depressed, and that one cause removed.

To judge whether the cataract adheres to the iris, if you cannot at once distinguish it by your sight, shut the patient's eye, and rub the lids a little; then suddenly opening it, you will perceive the pupil contract, if the crystalline humour does not prevent the action by its adhesion: and when this is the case in any kind of cataract, the operation can hardly be advised, though where the adhesion has been slight, I have now and then performed it with success.

Another consideration of the greatest moment, before undertaking the cure, is to be assured of the right state of the tunica retina, which is very readily learnt, where there is no adhesion of the cataract, from the light falling between the iris and crystalline humour, which if the eye is not sensible of, it is a certain indication of another malady, and absolutely forbids the operation. Generally, this cataract takes its rise from head-achs, convulsions, and nervous disorders. How the eye perceives in this case, *vide* the copper-plate.

The operation for the soft species of cataract, which may perhaps properly be stiled milky, has been by some writers falsely said never to succeed. Of this there are two sorts: some,

ſome, where we do not perceive any membrane, but which are almoſt uniformly ſoft, and admitting the needle through them as through water, are conſequently immoveable; and others where the humour is liqueſied, and contained in its own membrane, now pretty much thickened by the diſeaſe, which laſt frequently does well; for, upon breaking the membrane, the fluid burſts out and precipitates, and the membrane itſelf, if it is not depreſſed, in proceſs of time ſhrinks into a ſmall compaſs, or waſtes quite away.

Whether the whole cataract, after its ſubſiding, continues to lie at the bottom of the eye, or is quite waſted by being ſeparated from its veſſels, I have never had an opportunity of knowing poſitively by diſſecting one that had been couched; but by what we ſee of thoſe which have not been totally depreſſed below the pupil, and continue in that ſtate for ever after, we may ſuppoſe that they only waſte a little: I know one inſtance of a woman, whoſe cataract after couching became quite looſe in the eye, and in an erect poſture ſunk to the bottom; but by ſtooping the head forward, ſhe could bring it quite over the pupil. On the other hand, I once couched a perſon, when, upon the firſt attempt to depreſs the cataract, it ſuddenly ſprung up, and made its way through the pupil into the anterior chamber of the eye, where I left it, without endeavouring to diſlodge it again. In about ſix weeks it began to diminiſh, and at the end of ten weeks was entirely waſted, and the patient ſaw extremely well.

When none of the objections I have ſtated forbid the operation, it may be thus done:—having placed your patient in a convenient light, and in a chair ſuitable to the height of that you yourſelf ſit in, let a pillow or two be placed behind his back, in ſuch a manner, that the body bending forward, the head may approach near to you; then inclining the head a little backward upon the breaſt of your aſſiſtant, and covering the other eye, ſo as to prevent its rolling, let the aſſiſtant lift up the ſuperior eyelid, and yourſelf depreſs a little the inferior one: this done, ſtrike the needle through the tunica conjunctiva, ſomething leſs than one tenth of an inch from the cornea, even with the middle of the pupil, into the poſterior chamber, and gently endeavour to depreſs the cataract with the flat ſurface of it. If, after it is diſlodged, it ariſes again, though not with much elaſticity, it muſt again and again be puſhed down. If it is membranous, after the diſcharge of the fluid, the pellicle muſt be broke and depreſſed: if it is uniformly fluid, or exceedingly elaſtic, we muſt not continue to endanger a terrible inflammation, by a vain attempt to ſucceed. If a cataract of the right eye is to be couched, and the ſurgeon cannot uſe his left hand ſo dexterouſly as his right, he may place himſelf behind the patient, and uſe his right hand.

I have not recommended the ſpeculum oculi, becauſe, upon the diſcharge of the aqueous humour through the puncture, the eye being ſomewhat emptied, more readily admits the depreſſion of the cryſtalline humour, than when preſſed upon by the inſtrument.

As to the method of treating the ſucceeding inflammation (when it happens, for ſometimes there is none) I can adviſe nothing particular, but to refrain from thoſe collyria that are charged with powders; for the thinner parts flying off, leave a gritty ſubſtance in the eye, which muſt be pernicious; bleeding, and other gentle evacuations, are found abſolutely neceſſary. The uſe of cool applications externally is moſt eaſy to the eye; but, after all, there will ſometimes enſue a troubleſome ophthalmy, which with the uncertainty there always is of ſucceſs after the operation, have deterred moſt ſurgeons from undertaking it, and, till lately, from ſtudying the nature of the diſeaſe; but I fancy the operation will come into

greater

greater repute, when more generally practised by men of good character; for it is less the difficulty, than the abuse of it by pretenders, which has brought it into discredit.

Since the publication of the sixth edition of this Treatise, a method of removing the cataract by opening the cornea, and extracting the crystalline itself, has been discovered. The experience of a little more time will evince whether it be preferable or not to the old operation. For the manner of performing it, and the success attending it, I must refer the reader for the present to the Philosophical Transactions, and to the third edition of my Critical Enquiry; where I have said all I yet know on this subject.

CHAP. XXIX.

OF CUTTING THE IRIS.

THERE are two cases where this operation may be of some service; one, when the cataract is, from its adhesion, immoveable; and the other, when the pupil of the eye is totally closed up by a disorder of the muscular fibres of the iris, which gradually contracting the orifice, at last leaves the membrane quite imperforate. This last distemper has hitherto been deemed incurable. The adhesion of the cataract I have spoken of in the preceding chapter, and considered it as a species of blindness not to be relieved: but Mr. Cheselden has invented a method of making an artificial pupil, by slitting the iris, which may relieve in both the instances here stated.

In doing this operation, the patient must be placed as for couching, and the eye kept open and fixed by the speculum oculi, which is absolutely necessary here, for the very reason I would discard it in the other; since the flaccidity of the membrane from the issue of the aqueous humour, would take away its proper resistance to the knife, and make it, instead of being cut through, tear from the ligamentum ciliare; then introducing the knife in the same part of the conjunctiva you wound in couching, insinuate it with its blade held horizontally, and the back of it towards you, between the ligamentum ciliare and circumference of the iris, into the anterior chamber of the eye, and after it is advanced to the farther side of it, make your incision quite through the membrane; and if the operation succeeds, it will, upon wounding, fly open, and appear a large orifice, though not so wide as it becomes afterwards.

The place to be opened in the iris, will be according to the nature of the disease: if the membrane itself be only affected with a contraction, the middle part of it, which is the natural situation of the pupil, must be cut; but if there be a cataract, the incision must be made above or below the cataract, though I think it more eligible to do it above.

The contracted iris, from a paralytic disorder, is so often complicated with an affection of the retina, that the success is very precarious in this case. This operation, by what I have seen, has answered best in adhesions of the crystalline humour, though, to speak truly, but very seldom even there. As I would not mislead any one who shall practise an operation not yet much known in the world, I do confess that either the danger of the iris separating from the ligamentum ciliare, or of the wound not enlarging sufficiently, do upon the whole make the event very doubtful. I once performed it with tolerable success, and, a few months after, the very orifice I had made, contracted, and brought on blindness again. Since it has been discovered by the extraction of the crystalline, that a large wound may be made through the cornea without any bad consequence, I should imagine this operation would be much improved by introducing the knife perpendicularly through the cornea and iris, and cutting both at the same time, so that the

the incision of the iris should be exactly in the same part, and of the same dimensions as by the other method.

In these two chapters I have not once used the word *Uvea*, but have made mention of the *Ligamentum ciliare*, two or three times; both which parts are but little understood for want of proper explanation; but which must be rightly conceived of, in order to understand what I have said upon these diseases.

The generality of anatomists call that membrane, which I have spoken of under the name of iris, the uvea, and its anterior lamina, the iris; others again call the membrane, uvea, and the colour of it, iris; but both one and the other distinction confound learners exceedingly, and take their rise from a want of proper attention to the history of anatomy. The ancients, who have given most of the names we now employ in the description of the eye, were versed chiefly, if not altogether, in the dissection of brutes, amongst which, those of the graminivorous kind have a party-coloured choroides, one half of it being dark, and the other of a light shining green; this last, from its resemblance to an unripe grape, was called the uvea; but the succeeding writers amongst the moderns, applying themselves to human dissections only, and not duly considering the difference of the human choroides, which is nearly of an uniform colour, and of that above described, have retained the appellation, though we have not the thing. Hence have arisen the great variety of misapplications of this word, which ought no more to be adopted in the anatomy of the human eye, than the tunica nictitans, which is proper to certain beasts and birds.

The ligamentum ciliare is that circular line on the globe of the eye, where the sclerotis, choroides, retina, cornea, processus ciliares, and iris, terminate, forming a whitish ring somewhat denser than any other part of the coats; but since the institution of this term, the description of the part it implies has been very much neglected, and the term itself confounded with the processus ciliares; wherefore it was necessary to define it, that the process of the operation of the iris might be better comprehended.

PLATE X.

THE EXPLANATION.

A. The couching-needle, the broad part of which towards the point is flat on one side; but on the other, is a little convex, to give it more substance and strength.

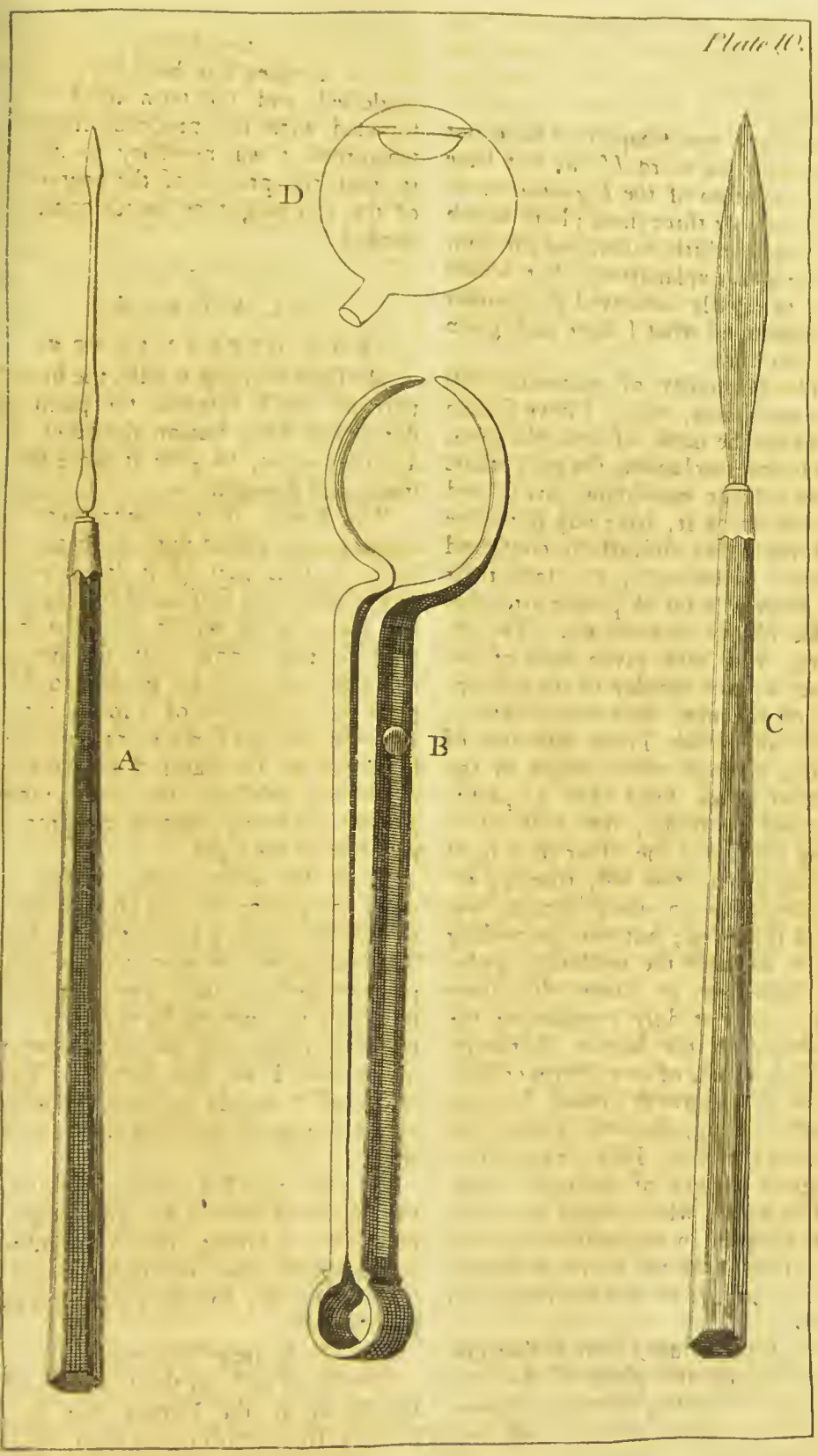
The handle of this instrument is white ivory, inlaid with a streak of black in that part of it lying even with the convex surface of the blade: the meaning of which is, that by holding the handle with the streak upwards, we may be guided to depress the membrane of a milky cataract with the flat surface, though the substance of the cataract swimming in the eye obscures the needle, and prevents its being directed in a proper position by the sight.

B. A speculum oculi, which is made to open or shut by an iron button sliding along a slit in the handle. This instrument is composed of one piece of steel, in such a manner that it would fly open by its elasticity, if the two branches of the handle were not confined by the button. The circle of it should be covered with velvet, to make it lie softer on the eyelids.

C. The knife for cutting the iris, the blade of which has two edges, resembling a lancet, which are more advantageous than one only, in cutting the cornea for the extraction of the cataract.

D. The figure of the eye.

The small arch on the fore part of the figure is the cornea, the two straight lines tending to each other are the iris, and the opening between them is the pupil; the space between the


D
A
B
C

the cornea and the iris, is the anterior chamber of the eye; the spheroidal body is the crystalline humour; the space between the iris and crystalline humour, is the posterior chamber; and the two short lines which arise from the meeting of the cornea, iris, &c. and run upon the crystalline humour, are the processus ciliares. The design of this representation is to shew the smallness of the posterior chamber, and how some light may pass obliquely between the iris and crystalline humour, through the interstices of the ciliary processes, and occasion that degree of sight which people with cataracts have.

CHAP. XXX.

OF THE FISTULA LACHRYMALIS.

THE fistula lachrymalis is generally understood to be such a disorder of the canals leading from the eye to the nose, as obstructs the natural progress of the tears, and makes them trickle down the cheek; but this is only the first and mildest stage of the disease; in the next, there is a mucus resembling matter, and afterwards matter itself discharged with the tears from the puncta lachrymalia, and sometimes from an orifice broken through the skin between the nose and angle of the eye: the last and worst degree of it is, when the matter of the abscess, by its long continuance, has not only corroded the neighbouring soft parts, but also affected the subjacent bone.

For the better understanding the seat and nature of this distemper, I have here annexed a representation of the lachrymal ducts.

In treating of the fistula lachrymalis, most writers mention the inflammation and ulceration of the saccus, as being sometimes the immediate causes of it; but then they all suppose that the tears becoming acrid and corrosive, excite the inflammation and abscess; though many of them imagine that the tears themselves, not finding a way through the nasal duct, do, from stagnating in the saccus, corrupt and become the matter discharged by the puncta lachrymalia; but the latter opinion is most certainly ill-grounded; for besides that the tears are not of a composition to become pus, it may be observed almost at any time upon pressing the abscess, that the two fluids appear unmixed; and with regard to the general doctrine of the sharpness of the tears producing the disorder, I think it is much to be questioned; since the cornea and tunica conjunctiva being more sensible membranes than the saccus, would more readily be offended by them; but as we see they are not in the least injured, and every part of an animal body is subject to inflammation, &c. from internal causes, I believe this external one may be justly doubted.

Whatever be the cause of the inflammation, whether the small-pox, lues venerea, &c. the effect of it is an obstruction of the ductus ad nasum. That a total obstruction should follow upon an inflammation in so large a vessel as the nasal duct, I presume is owing to its situation in the bony groove of the os unguis, which not allowing it to dilate in its inflammation and thickening, must necessarily make it fill up the whole channel, and cause that regurgitation of tears and matter, which is the constant symptom of this disease.

Some years since, Monsieur Annell, a French surgeon, recommended, in the recent fistula, to pass a small probe through one of the puncta lachrymalia into the saccus and nose, in order to break the concretions which were supposed to make the obstruction, and with a small pipe and syringe, to throw an injection through the other, in order to wash them away. This method was at first received with great applause, and still continues to be practised by some very eminent surgeons; yet, by what I have been able to learn from the experiments of others, and the reason of the thing, I am by no means inclined to think favourably

favourably of the invention; for as the very characteristic of this state of the fistula, is the reflux of the tears from the saccus, the channels leading to it from the puncta lachrymalia must be supposed clear; and as to the obstruction in the nasal duct, an injection thrown with so little force, can hardly be imagined sufficient to remove it; and still less, if it be true that the obstruction is not owing to any loose substance clogging up the passage, but to an inflammation of the membranes.

If, then, the injection cannot assist by the force of its stream, the advantage must arise from its balsamic qualities; but no surgeon at this time dilates an abscess of any kind by injections, when the pus is good conditioned, and he can by compress diminish the cavity of it, as may be done in this very case, and which should be practised before any other method is undertaken: indeed Annel and his followers, after the injection, applied a compress and bandage, to the good effects of which, rather than any of the other processes, I am inclined to think the success was owing.

When the quantity of matter returned by the puncta increases, notwithstanding the use of compress, and the tumour of the saccus grows larger, it then becomes necessary to perform the operation, the design of which is to cure the ulcer, and make way for the tears into the nose.

The general notion that the abscess of the bag always occasions a caries of the os unguis, perhaps may have led surgeons into the method of destroying both saccus and bone with a perforating instrument, and afterwards more effectually with an actual cautery, in order to remove the disordered bone, and at the same time to make an artificial canal into the nose; but as there are many instances of cure by a mere incision of the saccus lachrymalis, the rougher method of perforation ought not to be used, unless there is evidently a caries in the adjacent bone, or that after the ulcer of the saccus is healed, the tears cannot be made to pass through the duct; though even in that case, the application of fire is not only generally useless, but often proves hurtful, and defeats the very end it was intended to promote. The design of the cautery is, to prevent the artificial canal made by the perforation from closing; but the operators who recommend it, confess that in persons who have been cauterised, even at the best, the tears trickle down ever after: whereas that accident does not so often attend on those where the incision only is practised: the reason of this difference may perhaps be more clearly explained by a parallel instance: if we divide a vein quite through, and cauterise its extremities, it is well known that the sloughs formed by the fire, hardly ever separate from the living parts of the vein, until they are totally closed up so as to prevent any effusion of the circulating blood; the consequence of which is, the breaking off the communication of the divided parts of the vein; whereas, if there was only an opening made with a sharp instrument, or even a piece of the vein carried away by it, the divided parts would soon re-unite, and the circulation be continued through them: for the same reason, by the use of the cautery, the communication between the puncta lachrymalia and saccus will often be entirely destroyed: and the perforation into the nose, though it remain open, will of consequence not answer the purpose for which it was intended.

It may perhaps be said, that by introducing the cautery through a canula, the upper part of the saccus, or opening of the lachrymal channels, may be protected from these ill effects; but I believe it will plainly appear, by the rudeness of the scar after the healing of the wound, how powerfully fire will work upon the neighbouring parts, notwithstanding this precaution.

From what has been said of the nature of this disease, the use of fire must

must be discarded in all the stages of it, and even perforation for the most part be practised, only when the subjacent bone is carious; but this circumstance is very rare, and for my own part, since I have doubted its frequency, it has not been my fortune to meet with a single instance of it, though I have had fistulas of many years standing under my care, in some of which the pus has found issue through the bag and skin, and formed an external ulcer likewise. The reason why the inferior part of the saccus is not so often corroded as the superior (in which case the bone would necessarily be affected) is, that here, as in every other part of the body, abscesses will break where they are least under confinement, as in those places they sooner give way to the preternatural influx of the juices, and in consequence becoming weaker, will sooner be destroyed. Since, therefore, neither the long continuance of the disease, nor the great discharge of matter, are positive symptoms of a caries, we ought to be well satisfied of it by the feel of the probe, before we perforate; but if, upon opening the bag, or in the course of dressing, it appears the os unguis is bare, we are not to wait for an exfoliation, the bone being so very thin, but to break through with a small perforator.

Many writers mention the success of having sometimes treated the fistula lachrymalis as a mere abscess of the saccus, though in general they recommend the use of fire; but when the abscess is so foul as not to cure by incision, a piece of the bag itself must be cut away; and thus Celsus treated the fistula lachrymalis (though he also used the cautery) without perforating.

The manner of operating in those cases where perforation is not required, is this: supposing the abscess not broken, choose a time when it is most turgid with matter; and to this end, you may shut the patient's eye the day before, and lay little slips of plaster upon one another across the lids; from about the puncta lachrymalia to the internal angle; which compressing their channels, and preventing the flux of the matter that way, will heap it up in the bag, and indicate more certainly the place to be cut. If the abscess is already open, the orifice and probe will inform you where to enlarge; then placing the patient in a seat of convenient height for the management of your hand; with a small incision-knife dilate from the upper part of the bag, down to the edge of the orbit, without any regard to the tendon of the orbicularis muscle, or fear of wounding the blood-vessels; though if you see the vessels, it is proper to shun them: the length of this incision will be near four-tenths of an inch. It has been advised in opening the bag, to introduce a small probe through one of the puncta into its cavity, to prevent wounding the posterior part of it; but I think this excess of care may be more troublesome than useful; since, in so large a vessel, a very small share of dexterity is sufficient to avoid the mistake. In making this incision, care must be had not to cut too near the joining of the eye-lids, because of the deformity of the succeeding scar: though the blear-eye, or uneven contraction of the skin in that part, after the operation, is generally owing to the use of the cautery, and not to the wound of the tendon of the orbicularis muscle; for this last is necessarily, from its situation, always cut through, but without any inconvenience, because of the firm cicatrix afterwards that fixes it strongly to the bone.

When the bag is open, it is to be filled with dry lint, which the next day may be removed, and exchanged for a dossil dipped in a soft digestive medicine; this must be repeated every day once or twice, according to the quantity of the discharge; now and then, when the matter is not good, using the precipitate medicine, and from time to time a sponge-tent, to prevent the too sudden re-union of the upper part of the abscess. When the

the discharge begins to lessen, it will be proper to pass a small probe, a small bougie, or silver wire, through the nasal duct into the nose, every time it is dressed, in order to dilate it a little, and make way for the tears and matter, which, by their drain, will continue to keep it open. This method must be followed till the discharge is nearly over (which will be in a few weeks) and then dressing superficially with dry lint, or any drying application, the wound will seldom fail of healing.—After the cure, in order to prevent a relapse, it will be proper, for a few weeks, to wear the compressing instrument represented in the copper-plate.

When the bone is bare, and the fistula requires perforation, the perforator is not to be carried down the ductus ad nasum, for fear of boring into the sinus maxillaris; but more internally towards the nose, which will bleed freely, if properly wounded: the wound afterwards should be dressed with dossils, in the manner above described, and the probe or silver wire be every day passed through the ductus ad nasum, lest after the cure of the abscess, it should still remain obstructed; and if upon trial the duct should be so filled up as not to admit the wire, it will be right to keep open the perforation into the nose with a small tent, till the discharge is almost quite ceased.

I shall finish this chapter with observing, that though a weeping eye will sometimes remain after the treatment of the fistula lachrymalis, yet the inconvenience of it is so small, compared with a discharge of matter, that it would be happy if this were the worst consequence of the operation; but it sometimes happens, that the ulcer, when healed, breaks out again, and sometimes too, that it cannot be quite healed, by reason of the inferior part of the saccus and nasal duct lying so deep below the edge of the orbit, which makes the proper application of dressings to the bottom of the ulcer more difficult: it is this situation of the saccus, that in a great measure prevents any good effects from burning, and perforating, if the perforation only be dressed, as is very much practised, since the dressing will be full four-tenths of an inch above the lowest part of the ulcer.

With regard to the trickling of the tears, though, generally speaking, it is prevented by the method I have recommended; yet it does not appear at all wonderful, it should so frequently be the consequence of the others, when we consider how much at best the saccus contracts after a great deal of it has been destroyed; and how possible it is for the wound to fill up with granulations of flesh, which cannot fail to prove an obstacle to their passage into the nose.

PLATE XI.

THE EXPLANATION.

A. The eye, with the skin of the eye-lids, denuded, in order to shew the orbicularis muscle: the white streak running from the inner angle of the eye towards the nose, is called the tendon of the orbicularis muscle, though I think it rather a small ligament. At a little distance from the internal angle, on the edge of the eye-lids, may be observed two black spots, which are the orifices of the lachrymal channels, and called the puncta lachrymalia.

B. The exact dimension of the lachrymal channels and bag; the pricked line represents the edge of the orbit. I have here taken care to shew the oblique direction of the bag, as it runs from the nose towards the orbit.

From comparing this figure with the situation of the puncta lachrymalia in the foregoing one, it will appear that only the upper part of the bag lies under the tendon of the orbicularis muscle, and consequently is the only part wounded, and burnt through in the common operation, when the perforator is carried horizontally from the angle into the nose,

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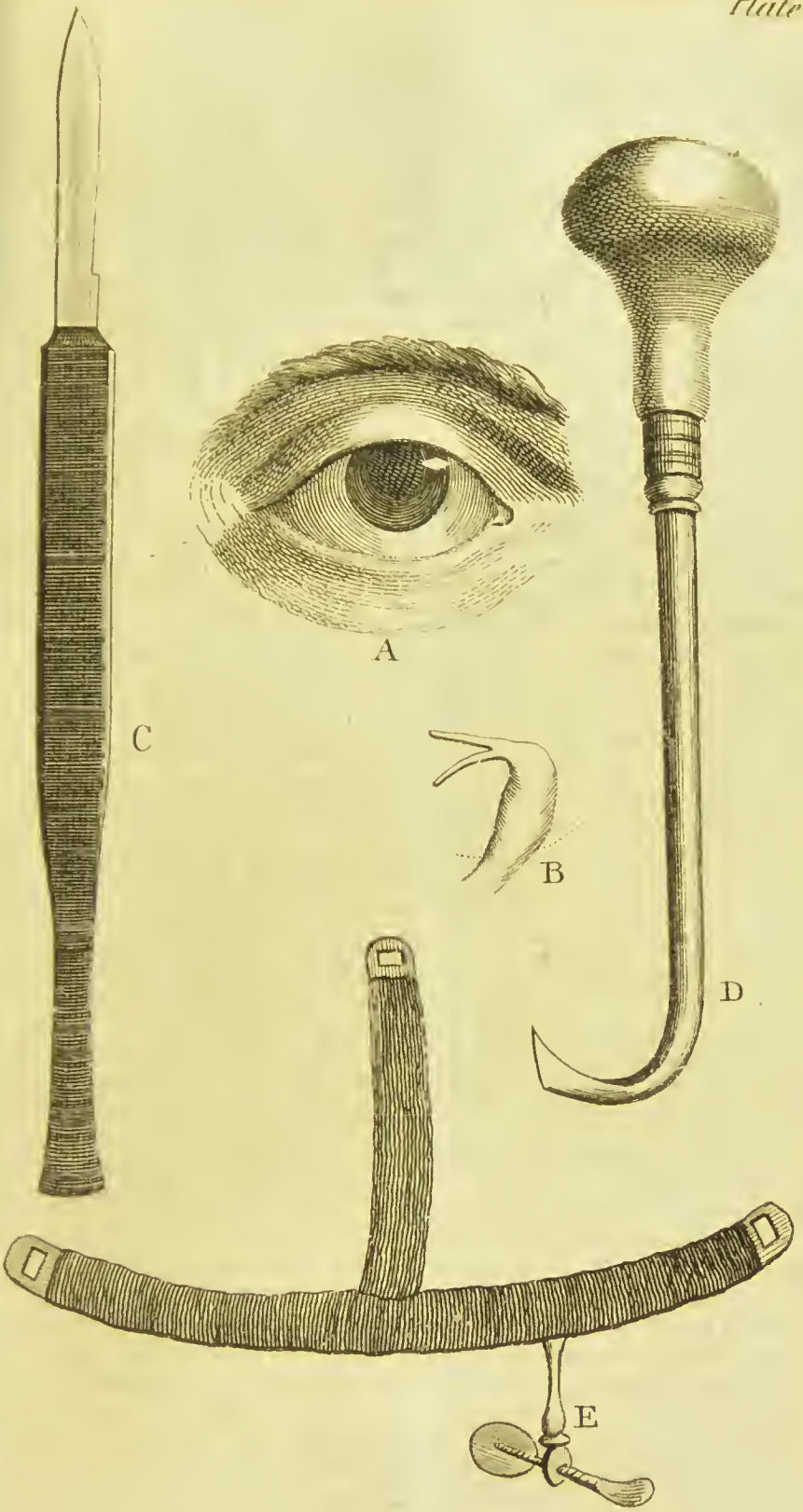
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as is generally practised. And I believe the size of the bag here represented, though not so large as when it is diseased, will at once shew the propriety of opening it first by an incision down to the orbit, or even farther, and then treating the fistula with the same dressings as we do other fistulous ulcers.

C. A small incision-knife, more handy than a larger for opening the bag.

D. The perforator, to destroy the os unguis, if ever it should happen to be necessary.

E. An iron instrument, made thin and pliable, to set even on the forehead, and for use covered with velvet; the holes at the three extremities receive two pieces of ribbon, by which it is fastened on the forehead: the button at the end of the screw is to be placed on the saccus lachrymalis, and the screw to be twisted till the button makes a considerable pressure on the bag: the button should be covered with velvet, and a little compress of plaster should be laid on the bag before it is applied, to prevent the skin from being galled by the pressure. The little branch of iron which receives the screw, must be soft enough to admit of bending, otherwise it will be difficult to place the button exactly on the bag. This instrument is for the left eye only. It should be worn night and day in the beginning of a fistula, and after a fistula has been healed by incision; but as the success depends upon the exact situation of the button upon the bag, it should be carefully looked after.

CHAP. XXXII.

OF THE BRONCHOTOMY.

THE operation of bronchotomy is an incision made in the aspera arteria, to make way for the air into the lungs, when respiration is obstructed by any tumour compressing the larynx, or some other disorder of the glottis and aspera arteria, without any apparent tumour. These are the cases in which it is supposed to be useful; but I am inclined to think it hardly ever can be of service, but where the complaint is attended with some swelling, since I cannot find any instance to my satisfaction of good done by this operation in the other species of angina; nor has it appeared, upon examination of several who have died of it, that the air was obstructed by any stricture of the glottis or aspera arteria: if then the passage remains open, and respiration be disturbed from other causes, the making a new orifice can be but of little advantage. I once performed it under this circumstance, but it gave no sort of relief.

Upon the whole then, I imagine the practice of this operation useful only in that species of angina, where the throat is exceedingly enlarged by the swelling of the thyroid gland, and parts adjacent, called bronchocele, which, by their weight, may press upon the trachea, so as to make it in some degree narrower, and prevent the free course of the air to and from the lungs. But should any one judge it proper in the instance I object to, the operation is so easy to perform, and so utterly void of any danger whatsoever, notwithstanding the frightful cautions laid down by writers, that I would not altogether discourage the trial, till I have farther proof of its insignificance.

The manner of doing it is by making a longitudinal incision through the skin, three quarters of an inch long, opposite to the third and fourth ring of the trachea, if you have the choice of the place; and when you cannot make it so high, the rule will be to wound a little below the tumour: it is always advised to pinch up the skin for this process, which however may be left to the discretion of the surgeon. When the skin is cut through, you must make a small transverse incision into the wind-pipe, and immediately introduce a silver crooked canula near half an inch long,

long, with a couple of little rings at the top of it, through which a rib-bone may be paſſed round the neck, to keep it fixed in the wound.

Some have preſcribed making an inciſion through the ſkin and trachea at once, with a lancet or knife, as the more eaſy and expeditious method; and I once ſaw it performed in that manner, but it proved very inconvenient; for the wind-pipe in reſpiration moving up and down, ſlipped from the orifice of the ſkin, and made it very difficult to introduce the canula, and afterwards to maintain it in its ſituation: wherefore I think it abſolutely neceſſary, to make the external inciſion longitudinal, and even pretty large, as I have directed above.

The caution laid down of raiſing the ſternohyoidei and ſternothyroidei muſcles, before cutting the wind-pipe, is not to be regarded; and as to the diviſion of the recurrent nerves and blood-veſſels, ſo much apprehended in this operation, it is not in the leaſt to be feared; ſince they are quite out of the reach of the inſtrument, as any one ſkilled in the anatomy of thoſe parts muſt very well know.

The method of dreſſing will be eaſily underſtood, ſince after the patient can breathe by the natural paſſage, if you withdraw the hollow tent, the wound will become a ſimple one, and notwithſtanding its penetration through a cartilage into a large cavity, require a ſuperficial application only.

CHAP. XXXII.

OF THE EXTIRPATION OF THE TONSILS.

THESE glands ſometimes grow ſo large and ſcirrhous as to become incurable, and even to threaten ſuffocation, if not extirpated. The manner of doing this operation formerly, was, by cutting them off; but the almoſt conſtant conſequence of this wound was a violent bleeding, and ſometimes too a mortal one; on which account it is rejected in favour of the ligature, which is not only void of danger, but alſo ſeldom fails of cure.

If the baſis of the tonſil is ſmaller than the upper part, you may paſs the ligature by tying it to the end of a probe, bent into the form of an arch, and ſet into a handle, which being carried beyond the gland, and round it, is to be brought back again; this done, you may eaſily tie it by the means of an inſtrument of Mr. Cheſelden's contrivance, which holds one end of the ſtring on the ſide of the tonſil next the throat, while you make the knot by pulling the other with the right hand quite out of the mouth, as will be eaſily underſtood by the draught in the copper-plate. Should it happen that the tonſils are conical, ſo that the ligature will neceſſarily ſlip over its extremity when we attempt to tie, in this caſe he has recommended an inſtrument like a crooked needle, ſet in a handle, with an eye near the point threaded with a ligature, which is to be thruſt through the bottom of the gland, and being laid hold of with a hook, the inſtrument is to be withdrawn; then pulling the double ligature forwards, it muſt be divided, and one part be tied above, and the other below the tumour: the knots are to be always double, and the ligature to be cut off pretty near them: however, to confeſs the truth, I have never in one inſtance been obliged to uſe this method; for where the tonſils have been conical, I have employed a very thin thread, which has cut into the ſubſtance of the gland a little, and making a ſmall groove, prevented its ſliding over. If after four or five days they ſlip, or ſeem to have mortified the tonſil only in part, you muſt repeat the whole operation; and if it fail a ſecond time, you muſt even repeat it again, as I have ſometimes done, though it frequently happens, that the cure is effected by the firſt operation.

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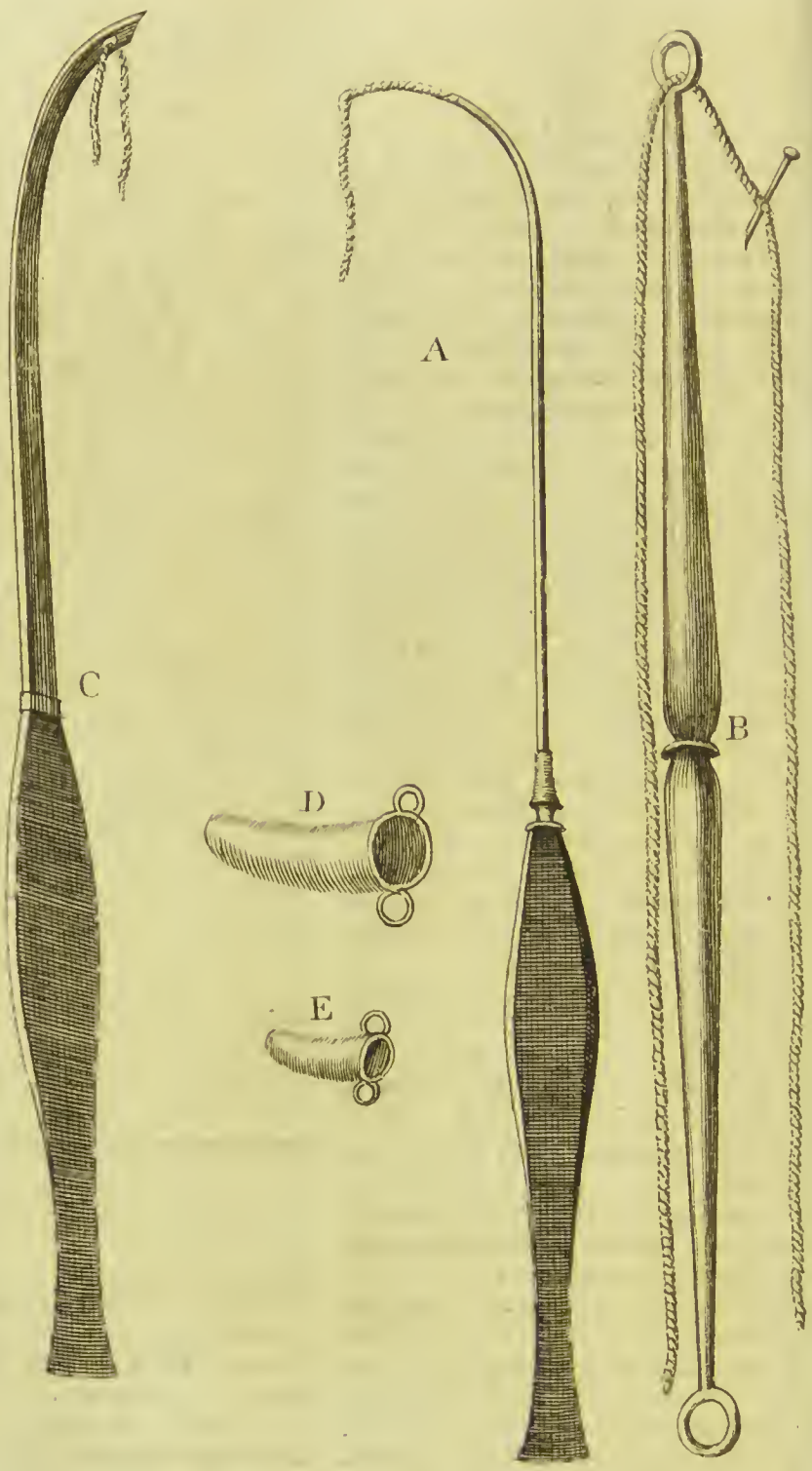
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This kind of extirpation is more practised in large piles, that are esteemed incurable; and if the success of it were better known, the operation would be much more frequent. I have by this method cured several people that have discharged blood every stool for many years, and some that have been almost quite destroyed by the repeated losses of it. When the piles are withinside of the intestine, you must place your patient over a fomentation in a close-stool, and have a crooked needle with a double ligature ready to pass through them, when by straining they are pushed out of the anus (for sometimes the intestine will return suddenly) and tie above and below as in the instance of the tonsil.—Sometimes the piles are of that shape as to admit a single ligature to be tied round them without the help of a needle, which is less painful: if there are several, you must only tie one or two at a time; for the pain of the ligature is excessive; and would be intolerable if many were tied at once: however, every five or six days, the operation may be repeated, till all are extirpated, and the parts must be kept supple by some emollient ointments.

When the piles are small, they may safely, and with much less pain, be cut off; but when this method has been taken with very large ones, I have seen the patient in the utmost danger, from a violent effusion of blood.

The uvula is subject to so great a degree of relaxation sometimes, that it almost choaks the patient; the readiest cure is cutting off all but half an inch of it, which may be done at one snip with a pair of scissars (particularly curved for that purpose) laying hold of it with a forceps, lest it should slip away. I once cut off a uvula that lay rolled upon the tongue about two inches; the patient recovered immediately, and never felt any inconvenience afterwards.

PLATE XII.

THE EXPLANATION.

A. The bent probe fixed in a handle, with the ligature made of the same thread as the ligatures for trying the blood-vessels.

B. The iron instrument for tying the tonsils.

I have here made a knot upon a pin, which is to be supposed in the situation of one of the tonsils, and may easily be imagined to have been tied by pushing the string beyond it, when held firm by one hand against the instrument, and pulled by the other, on the outside of the mouth.

This instrument is also of great service in extirpating, by ligature, a species of scirrhus that sometimes grows from the neck or cavity of the uterus.

C. The needle with the eye towards the point, for passing the ligature through the tonsil, when the basis is larger than the extremity.

D. A canula made of silver, to be used in the empyema.

E. A canula to be used in bronchotomy.

To keep the canulas in their place, small ribbons may be passed through the rings of them, and carried round the body and neck; or they may be held by a ligature run through, and fastened to a hole cut in a piece of sticking-plaster, which is to be laid on each side of them.

CHAP. XXXIII.

OF THE POLYPUS.

THE polypus of the nose is said to be an excrescence of flesh, spreading its branches amongst the laminæ of the os ethmoides, and through the whole cavity of one or both nostrils. It happens very often to both sides of the nose at once, and in that case is very troublesome, almost suffocating the patient, at least making respiration very difficult. The intent of the operation is the removal of

of this obſtacle; but as it is attended with different events from the variety of nature in the ſeveral ſorts of polypuſes, I ſhall endeavour to diſtinguiſh their ſpecies, ſo as to lead us into ſome judgement of the greater or leſs probability of ſucceſs.

They all ariſe from the membrane ſpread upon the laminæ ſpongioſæ, pretty nearly in the ſame manner as the hydatids of the abdomen, in one kind of dropſy, do from the ſurface of the liver; or as ganglions from the tendons, borrowing their coats from a production of its fibres and veſſels: if they appear ſoft, and of the colour of the ſerum of the blood, in all likelihood they are formed of ſuch a ſort of water contained in cyſts, which, upon breaking the membrane, leaves ſo little hold for the inſtrument, that but a ſmall part of it can be extracted afterwards. This polypus is to be left to harden, before the operation be undertaken, which in proceſs of time it generally will do. In the next degree of conſiſtence, they retain pretty nearly the ſame colour, and are often partly watery, and partly of a viſcid texture, which though not tenacious enough to admit of drawing them out by the roots, may at ſeveral attempts be taken away by bits. The next degree of conſiſtence, is that which is neither ſo ſoft as to be ſqueezed to pieces, nor ſo hard and brittle as to crumble, or adhere to the membrane with that force as not to admit of ſeparation: this is the moſt favourable one. The laſt, is hard and ſcirrhous, adhering ſo tight as to tear rather than ſeparate in the extraction, and ſometimes even tends to degenerate into a cancer: this polypus is very difficult of cure.

The polypus ſometimes dilates to that degree, as not only to extend beyond the os palati, and hang over the œſophagus and trachea, but alſo ſpreading into the ſinus maxiliaris, ſo exactly fills up every interſtice of the noſe, as to obſtruct the lower orifice of the ductus ad naſum, and prevent the deſcent of the tears, which neceſſarily muſt return through the puncta lachrymalia: and ſometimes they grow ſo enormouſly large, as even to alter the ſhape of the bones of the face.

When the polypus appears in the throat, it is always adviſeable to extract it that way; it being found by experience, more ready to looſen when pulled in that direction, than by the noſe. To this end, it would be right, before undertaking the operation, to let your patient lie ſupine two or three hours, which will bring it ſtill farther down; for the body of the polypus does not univerſally adhere, and will by its weight ſtretch out the fibres, by which it is connected to the noſe; nay, there are inſtances where, by a little effort, ſuch as hawking, they have dropped quite off.

The method of extracting it is, by a pair of forceps, with a ſlit at their extremities for the better hold, which muſt be introduced into the noſtril about an inch and a half, to make more ſure of it towards the roots; then twiſting them a little from one ſide to the other, you muſt continue in that action, while you pull very gradually the body of the polypus. If it break, you muſt repeat the extraction as long as any remains, unleſs it is attended with a violent hæmorrhage, which is an accident that ſometimes follows upon the operation, and ſeldom fails when the excreſcence is ſcirrhous: however, the ſurgeon is not to be alarmed at the appearance of an immoderate effuſion the moment after the ſeparation, for, generally ſpeaking, the veſſels collapſe very ſoon again; but if they do not, dry lint, or lint dipped in ſome ſtyptic, will readily ſtop it.

After the extirpation, it has been uſual, in order to prevent a relapſe, to dreſs with eſcharotic powders, and even to burn with the actual cautery: but neither the one or the other can be of great ſervice in this caſe, and both are painful and dangerous. If ever the uſe of corroſive medicines is adviſeable,

adviſeable, it ſhould be for deſtroying the remainder of a polypus, which cannot all be taken away; and then the eſcharotics may, in my opinion, be better conveyed to the part by a long tent, than a ſeton paſſed through the noſe and mouth, which is difficult to do without hurting the patient, and very naſty to bear, though this is the method at preſent practiſed, and recommended by ſome eminent ſurgeons.

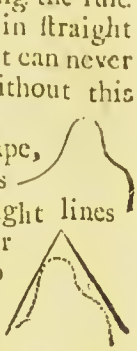
CHAP. XXXIV.

OF THE HARE-LIP.

THE diſeaſe is a fiſſure in the upper lip, with want of ſubſtance, and is a natural defect, the patient being always born with it, at leaſt that ſpecies of hare-lip which requires the operation I am going to deſcribe. The cure is to be performed by the twiſted ſuture, the explanation of which I have reſerved for this chapter. There are many lips, where the loſs of ſubſtance is ſo great, that the edges of the fiſſure cannot be brought together, or at beſt where they can but juſt touch, in which caſe it need not be adviſed to forbear the attempt: it is likewiſe forbidden in infants, and with reaſon if they ſuck, but otherwiſe it may be undertaken with great ſafety, and even with more probability of ſucceſs than in others that are older, as I have myſelf experienced.

It is not uncommon for the roof of the mouth to be fiſſured likewiſe; but this is no objection to the operation; if the ſkin of the lip is looſe enough to admit of re-union: and it may be remarked, that the fiſſure of the palate, in length of years, cloſes ſurpriſingly in ſome caſes.

The manner of doing it is this:—you firſt with a knife ſeparate the lip from the upper jaw, by dividing the frænulum between it and the gums; and if the dentes inciſorii project, as is uſual in infants, they muſt be cut out with the ſame knife; then with a thin pair of ſtraight ſciſſars take off the callous edges of the fiſſure the whole length of it, obſerving the rule of making the new wound in ſtraight lines, becauſe the ſides of it can never be made to correſpond without this caution.—For inſtance,



If the hare-lip had this ſhape, the inciſion of the edges muſt be continued in ſtraight lines till they meet in the manner here repreſented. The two lips of the wound being brought exactly together, you paſs a couple of pins, one pretty near the top, and the other as near the bottom, through the middle of both edges of it, and ſecure them in that ſituation by twiſting a piece of waxed thread croſs and round the pins ſeven or eight times; you muſt then cut off the points, and lay a ſmall bolſter of plaſter underneath them, to prevent their ſcratching: but when the lower part only of the hare-lip can be brought into contact, it will not be proper to uſe more than one pin.

The pins I employ are made three fourths of their lengths of ſilver, and the other part towards the point, of ſteel; the ſilver pin is not quite ſo offenſive to a wound as a braſs or ſteel one; but a ſteel point is neceſſary for their eaſier penetration, which indeed makes them paſs ſo readily, that there is no need of the inſtrument to aſſiſt in puſhing them through. The practice of bolſtering the cheeks forward does little or no ſervice to the wound, and is very uneaſy to the patient; wherefore I would not adviſe the uſe of it. The manner of dreſſing will be to remove the applications, which are quite ſuperficial, as often only as is neceſſary for cleanlineſs. The method I would recommend is, to deſiſt the three firſt days, and afterwards to do it every day: I do not think it at all requiſite to dreſs between the jaw and lip where the frœnulum was wounded, there being no danger that an inconvenient adheſion ſhould enſue. In about

about eight or nine days, the parts are usually united, and in children much sooner, when you must gently cut the threads, and draw out the pins, applying upon the orifices a piece of plaster and dry lint. It will be proper, in order to withdraw the pins more easily, to dab the ligatures and pins with warm water, and also moisten them with sweet oil, two or three days before you remove them, which will wash off the coagulated blood, that would otherwise fasten them so hard to the ligature as to make the extraction painful.

The twisted suture is of great service in fistulas of the urethra remaining after the operation for the stone, in which case the callous edges may be cut off, and the lips of the wound be held together by this method.

CHAP. XXXV.

OF THE WRY NECK.

THE operation of cutting the wry neck is very uncommon, and is never to be practised but when the disorder is owing to a contraction of the mastoideus muscle only; as it can answer no purpose to set that muscle free by dividing it (which is all that is to be done) if the others in the neck are in the same state, and more especially if it has been of long standing from infancy; because the growth of the vertebræ will have been determined in that direction, and make it impossible to set the head upright.

When the case is fair, the operation is this. Having laid your patient on a table, make a transverse incision through the skin and fat, something broader than the muscle, and not above half an inch from the clavicle; then passing the probed razor with care underneath the muscle, draw it out and cut the muscle. The great vessels of the neck lie underneath; but I think, when we are aware of their situation, the danger of wounding them may be avoided. After the incision is made, the wound is to be crammed with dry lint, and always dressed so as to prevent the extremities of the muscle from re-uniting; to which end, they are to be separated from each other as much as possible by the assistance of a supporting bandage for the head, during the whole time of the cure, which will generally be about a month.

PLATE XIII.

THE EXPLANATION.

A. The instrument called the probe-razor, to cut the mastoideus muscle in the wry neck, and is sharp only about half its length, at that end where the blade is broad.

B. The two pins with the twisted suture, used in the hare-lip.

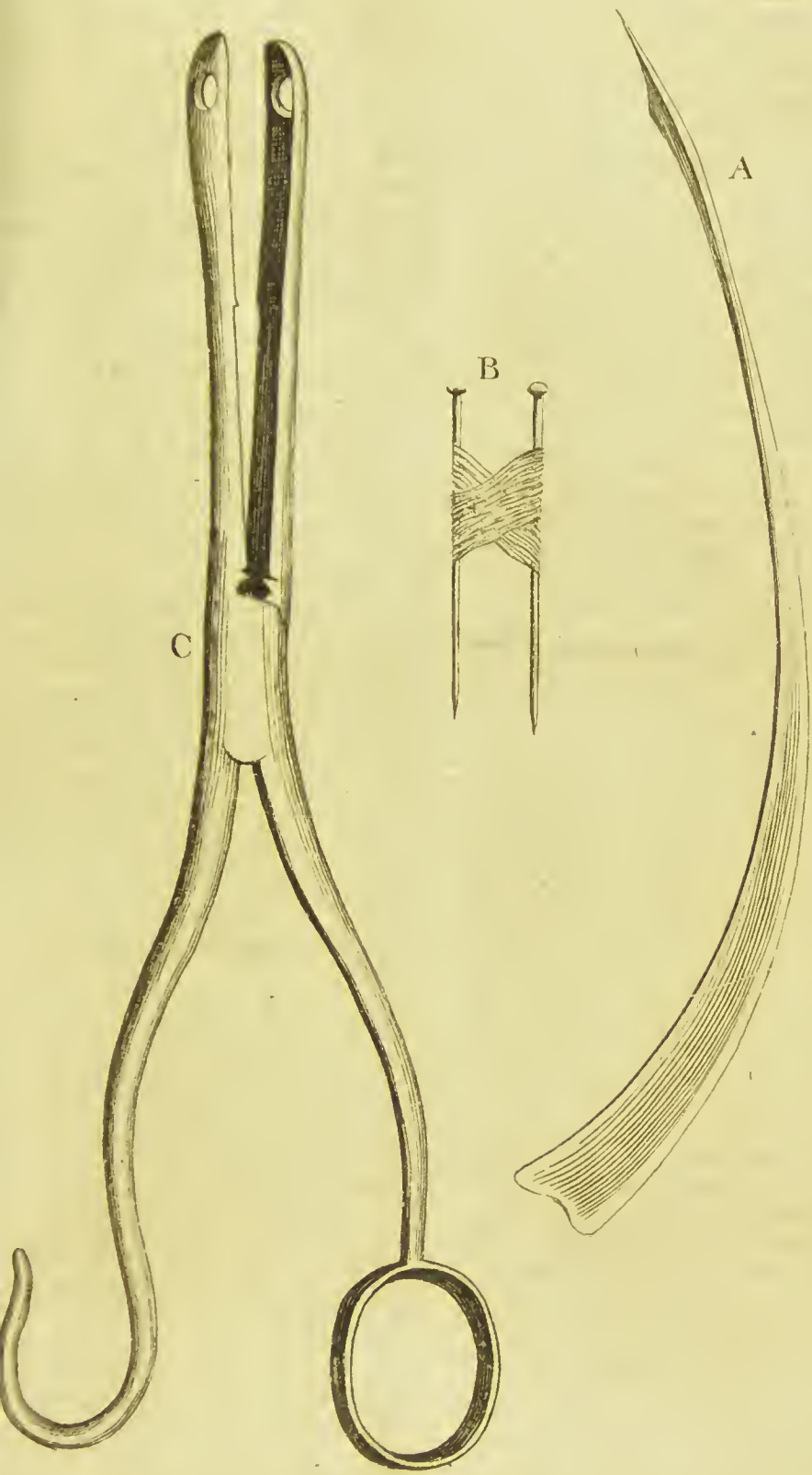
C. The polypus forceps, with one of the rings open for the reception of the thumb, which would be cramped in pulling the forceps with much force, if it were received in the same sort of ring as in the other handle. It is for this reason I have represented the stone forceps with open rings.

CHAP. XXXVI.

OF THE ANEURISM.

THIS is a disease of the arteries, in which, either by a preternatural weakness of any part of them, they become excessively dilated, or by a wound through their coats, the blood is extravasated amongst the adjacent cavities. The first species of aneurism is incident to every part of the body, but does not often happen, except to the curvature of the aorta, which is subject to this disorder from the extraordinary impulse of the blood on that part: from the curvature it runs upwards along the carotids, or subclavians, generally increasing, till by its great distension it is ruptured, and the patient dies.

There


A
B
C

There have been great disputes amongst writers, concerning the nature of this dilatation of the artery; some even denying the fact, and supposing it always a rupture; some, that all the coats are distended; others, only the external one; and again others, whose doctrine has been the best received, that the internal coat was ruptured, and the external dilated: these last have supported their hypothesis with arguments drawn from the anatomy of the internal coats which is ligamentous, and incapable of much distension; so that if an artery be inflated with a sufficient force, the air will burst that coat, and expand the external one, that is, make an artificial aneurism, in the same manner as blood is supposed to make a natural one: but this argument is of little force, when we consider, that there are many parts of an animal body, which violence cannot stretch considerably, but which, by the gradual influx of the juices, become susceptible of monstrous distension, as is the case of the uterus, and, upon observation, is evidently the case likewise of all the coats of the artery, as I have had an opportunity to examine in several aneurisms in the collection of the late Dr. Douglas, which he was so kind to lend me for that purpose.

There are several histories given of aneurisms of the curvature of the aorta, in some of which the vessel has been so excessively dilated, as to possess a great space of the upper part of the thorax; and the most curious circumstance to be gathered from them is, that the spot of the vessel which is weakest, and where the disease begins, generally gives way in such a manner to the force of the blood continually pushing it outwards, as to form a large pouch or cyst, with coats nearly as thick as those of the artery itself: however, the thickness of the coats of these cysts will last but to a certain period; for when the vessels of the coats can no longer conform to the extension, the circulation grows languid, the cyst becomes thinner at its apex, and soon after bursts.

From this description of the cyst, it will be understood to resemble the bladder, having a large cavity, and a narrow neck or opening:

The symptoms of this aneurism, are a strong pulsation against the sternum and ribs, every systole of the heart; and when it extends above the sternum, a tumour with pulsation: upon dissection, the ribs, sternum, and clavicle, are sometimes found carious, from the obstruction of the vessels of the periosteum, which are pressed by the tumour. What are the causes of a particular weakness in any of the coats of the artery, I cannot take upon me to determine: but it is worth observing, that the dilated aorta every where in the neighbourhood of the cyst, is generally ossified; and indeed ossifications, or indurations of the artery, appear so constantly in the beginnings of aneurisms of the aorta; that it is not easy to judge whether they are the cause or the effect of them.

What I have spoken of hitherto, has been only the aneurism of the thorax, from an internal disorder; aneurisms of the extremities are, for the most part, owing to wounds; though when they happen of themselves, they differ very little from the description I have given of that in the thorax: the farther symptoms of them are (besides pulsation) the tumour's being without discolouration in the skin; its subsiding when pressed by the hand, and immediately returning when the hand is taken away; though if it be upon the point of bursting, the skin will grow inflamed, and the coagulated blood in the cyst will sometimes make the pulsation much less perceptible.

This species of aneurism may sometimes be supported a great number of years, if we resist its dilitation by proper bandages; but if we do not, there is danger of its bursting; and, if it be pretty large, of rotting the adjacent bones.

A sound artery wounded through

 part

part of its external coat, would, in all probability, produce nearly the ſame appearances as where the whole coat is weakened from an internal indiſpoſition; and this moſt likely is the caſe after bleeding in the arm, when it has not been immediately perceived that the artery was pricked, and the tumour has begun to form ſome days after the puncture; though the common appearance of an aneuriſm from the wound of a lancet, is a diſcharge of blood firſt through the orifice of the ſkin, and, upon being ſtopped from bleeding outwardly, an inſinuation of it among all the muſcles as far as it can ſpread, in the ſhoulder and arm: here the arm grows livid from the ecchymoſis, and the blood coagulating to the conſiſtence of fleſh, prevents any ſenſible pulſation. The cyſt which ariſes near the orifice of the artery is formed by the cellular capſula enveloping the veſſels of that part, and a portion of the aponeuroſis of the biceps muſcle, which admitting of ſome extravaſated blood underneath it, become exceſſively thickened and expanded: theſe membranes muſt make the cyſt, otherwiſe we could not, upon opening the tumour in the operation, diſcover ſo readily the puncture; or if the coats of the artery made it, we could not ſeparate it diſtinctly from the veſſel, which would be always dilated above and below the cyſt, as we ſee in other aneuriſms.

There are ſome few inſtances of ſmall aneuriſms and punctures of the artery from bleeding, doing well by bandage; but they almoſt all require the operation at laſt, which is to be performed nearly in the ſame manner in every part; and ſuppoſing it in the bend of the arm, is to be done after the following method:

Having applied the tourniquet near the ſhoulder, and laid the arm in a convenient ſituation, make an inciſion on the inſide of the biceps muſcle, above and below the elbow a conſiderable length, which being in the courſe of the artery, will diſcover it as ſoon as you have taken away the coagulated blood, which muſt be all removed with the fingers, the wound being dilated ſufficiently for that purpoſe: if the orifice does not readily appear, let the tourniquet be looſened, and the effuſion of blood will direct you to it: then carefully carrying a crooked needle with a ligature under it, tie the veſſel juſt above the orifice, and paſſing the needle again, make a ſecond ligature below it, to prevent the return of the blood, and leave the intermediate piece of the veſſel to ſlough away without dividing it. To avoid wounding or tying the nerve in making the ligature, the artery may be cleared away from it firſt, and held up with a hook; but ſhould the nerve be tied with the artery, no great inconvenience would enſue from it. After the operation, the arm muſt be laid eaſy on a pillow in bed, and the wound be treated in the common method, keeping it in that poſture a fortnight or three weeks, eſpecially if it ſhould ſwell much, and not digeſt kindly.

In doing this operation, it will be proper to have the amputating inſtruments ready, leſt it ſhould be impracticable to tie the artery, though I have never met with ſuch an inſtance; and even after having tied it, the arm muſt be carefully watched; that in caſe of a mortification it may be taken off; which, though from experience we learn is very ſeldom the conſequence, ſhould to all appearance be the perpetual one; for theſe aneuriſms following always upon bleeding the baſilic vein, muſt neceſſarily be aneuriſms of the humeral artery, near an inch above its diviſion, which being obſtructed by the ligature, one would think ſhould neceſſarily bring on a mortification; but we ſee the contrary, though for ſome time after the operation we can hardly diſtinguiſh the leaſt degree of pulſe, and ever after it continues languid. If the humeral artery happens to divide above the elbow, which is not very uncommon, the proſpect of cure is better, and the pulſe will be ſtronger after the operation,

CHAP.

CHAP. XXXVII.

OF AMPUTATION.

A Spreading mortification has been always esteemed so principal a cause for amputation, that it is a fashion with writers to treat of the nature of a gangrene, previous to the description of this operation; and I think they have all agreed, that whatever the species of it be, if the remedies they prescribe do not prevent its progress, the limb must be amputated: however, this operation is spoken of as frequently unsuccessful, and, in length of time, its want of success has been so unquestionably confirmed by repeated experiments, that some of the most eminent practitioners here in England, make that very circumstance an exception to the operation, which so few years since was the great inducement; and the maxim now is, never to extirpate till the mortification is absolutely stopped, and even advanced in its separation.

Gangrenes may be produced two ways; either by indisposition of body, or by accident in a healthful state; for as the life of a part depends upon the circulation of its fluids, whatever shall make the circulation cease, will inevitably occasion a gangrene. Thus, a mere compress, preventing the course of the blood, as effectually causes a mortification, as any indisposition in the fluids or vessels.

It frequently happens in old age, that the arteries of the lower extremities ossify, which, destroying their elasticity, must in consequence produce a gangrene in the toes first, and afterwards in the limb nearly as high as where the ossification terminates; so that in mortifications arising from this cause, we at once see why amputation, during their increase, is of so little service, unless performed above the ossification; but we have no way to judge where the ossification ends, but by the inference we make from the gangrene's stopping; hence we may learn the propriety of our modern practice in this case.

If by any accident the limb has been injured to that violent degree as to begin to mortify, it will be no more fit to operate here till it stops, than in the other instance; because all parts that are mortified, have had the disposition to become so, before the effect is produced; and cutting off a limb, half an inch above the absolute dead skin, is generally leaving a part behind with the seeds of a mortification in it; so, unless we can be sure the vessels are not affected to the place of amputation, which will be hard to know but from the consequence, the operation will be useless.

Sometimes the fluids of the body are so vitiated, as to lose their proper nutritious qualities; and the limb becomes gangrened, not from any alteration it its vessels, but chiefly from its situation, which being at a great distance from the heart, will be more prone to feel the ill effects of a bad blood than any other part, as the circulation is more languid in the extremities: and it seems not very improbable that in some dispositions of the blood, a mortification may also be a kind of critical discharge. When therefore a gangrene arising from either of these causes, is running on, amputation above it will, for the most part, be useless, since it is only removing one degree of the effects of the bad juices, and leaving them in the same state to produce the like mischief in other parts: thus we see, after amputations on this account, the gangrene sometimes falls on the bowels, or the other extremeties; from which observation, I think we may conclude it not safe to amputate till the fluids are altered; and this alteration will presently discover itself by the stopping of the mortification.

I have laid it down as a rule, that the mortification should not only be stopped, but advanced in its separation; the reason of which is, that though the blood is so much altered for the better as to occasion a stop-

page of the gangrene, yet at this point of alteration, it is ſtill in a bad ſtate, and ſhould be left to mend, with the utmoſt tranquillity of body, and aſſiſtance of cordial medicines, till ſuch time as granulations of fleſh upon the living part of the extremity, ſhew the balſamic diſpoſition of the blood: in the mean while, to take off the ſteneh of the gangrene, it may be wrapped up in ſpirituous or odoriferous applications. I have ſeen ſome limbs taken off immediately upon the mortification's ceaſing, when afterwards the patients have ſunk from frequent effuſions of blood, not diſcharged by the great veſſels, but the whole ſtump: theſe hæmorrhages I conceive were owing to the thinneſs of the blood, which hardly gave a reddiſh tincture to the cloths and bandages: on the other hand, upon waiting a conſiderable time after the ceaſing of the mortification, I have taken off ſome myſelf with as good ſucceſs as for any other diſorder.

Gun-ſhot wounds, compound fractures, and all ſudden accidents requiring amputation, are attended with the beſt ſucceſs if immediately performed. Diſorders of the joints, ulcers of long ſtanding, and all ſcrophulous tumours, do ſometimes return on other parts after the operation. When a leg is to be amputated, the manner of doing it is this:

Lay your patient on a table two feet ſix inches high, which is much better than a low ſeat, both for ſecuring him ſteady, and giving yourſelf the advantage of operating without ſtooping, which is not only painful, but inconvenient in the other ſituation. While one of the aſſiſtants holds the leg, you muſt roll a ſlip of fine rag half an inch broad, three or four times round it, about four or five inches below the inferior extremity of the patella: this being pinned on, is to ſerve as a guide for the knife, which, without it, perhaps would not be directed ſo dexterouſly: the manner of rolling has always been perpendicular to the length of the leg; but having ſometimes obſerved, that though the amputation at firſt be even, yet afterwards the gaſtrocnemius muſcle contracting, draws back the inferior part of the ſtump more ſtrongly than the other muſcles can do the reſt of it, I have lately, in order to preſerve the regularity of the cicatrix, allowed for this exceſs of contraction, and made the circular inciſion in ſuch a manner, that the part of the wound which is on the calf of the leg is a little farther from the ham, than that on the ſhin is from the middle of the patella.

In the mean time, one of your aſſiſtants muſt carry a ſtrong ligature round the thigh, about three or four inches above the patella, which paſſing through a couple of ſlits in a ſquare piece of leather, he muſt twiſt with a tourniquet, till the artery is ſufficiently compreſſed, to prevent any great effuſion of blood; and to do it more effectually, he may lay a bolſter of tow or linen under the ligature, upon that part where the artery creeps. It will alſo be a little more eaſy to the patient, to carry a compreſs of linen, three or four times double, round the thigh, on that part where the ligature is applied, in order to prevent it from cutting the ſkin.

The courſe of the blood being ſtopped, you muſt begin your inciſion juſt below the linen roller, on the under part of the limb, bringing your knife towards you, which at one ſweep may cut more than the ſemicircle; then beginning your ſecond wound on the upper part, it muſt be continued from the one extremity to the other of the firſt wound, making them but one line. Theſe inciſions muſt be made quite through the membrana adipoſa, as far as the muſcles; then taking off the linen roller, and an aſſiſtant drawing back the ſkin as far as it will go, you make your wound from the edges of it when drawn back through the fleſh to the bone, in the ſame manner as you did through the ſkin. Before you ſaw the bones, you muſt cut the ligament between

tween them, with the point of your knife, and the assistant who holds the leg while it is sawing, must observe not to lift it upwards, which would clog the instrument; and at the same time not to let it drop, lest the weight of the limb should fracture the bone before it is quite sawed through.

In amputating below the knee, it is of advantage to stand on the inside of the leg; because the tibia and fibula lie in a position to be sawed at the same time, if the instrument be applied externally: whereas, if we lay it on the inside of the leg, the tibia will be divided first, and the fibula afterwards; which not only lengthens the operation, but it is also apt to splinter the fibula when it is almost sawed through, unless the assistant be very careful in supporting it.

When the leg is taken off, the next regard is to be had to the stopping the blood, which must be effectually done before the patient is put to bed, or there will be great danger of bleeding again, when the fever is excited, and the vessels of the stump dilated, both which happen a very little while after the operation. There is no method for this purpose so secure as taking up the extremities of the vessels with a needle and ligature, in the following manner: As soon as the amputation is performed, the assistant must loosen the tourniquet for a moment, upon which the orifices of the arteries will appear by the issue of the blood. The operator having then fixed his eye upon one of the largest vessels, passes a crooked needle through the flesh, a little more than a quarter of an inch above the orifice, and about the same depth, in such a direction, as to make nearly one-third of a circle round the vessel; then withdrawing the needle, he a second time passes it into the flesh and out again, in the same manner, and about the same distance below the orifice of the vessel: by this means the thread will almost encompass the vessel, and when it is tied (which should be done by the surgeon's knot) will necessarily inclose it within the strictnre. All the considerable arteries are to be taken up in the same manner;—that is, the tourniquet is to be loosened, in order to discover the vessel, and then the needle is to be passed round it, as I have here described. This is a much better way than using the artery forceps, where the vessels are apt to slip away out of the ligature; and as to styptic applications, their want of safety is so well known now, that the use of them, in hæmorrhages from large vessels, is almost universally rejected; though it is thought by several surgeons who have experienced the virtue of agaric, that it will be found to be a more powerful astringent than any hitherto discovered.

It sometimes happens in a large stump, that ten or more vessels require tying, which done, you must apply loose dry lint to the wound; or in case the small vessels bleed plentifully, you may throw a handful of flour among the lint, which will contribute to the more effectual stopping up the orifices: before you lay on the pledget, you must bind the stump, and begin to roll from the lower part of the thigh down to the extremity of the stump. The use of the roller is to keep the skin forwards, which, notwithstanding the steps already taken to prevent its falling back, would, in some measure, do so, unless sustained in this manner. The dressing may be secured by the cross cloth and gentle bandage; and the method of treating the wound may be learnt from what has been said with respect to recent incised wounds.

Before the invention of making the double incision I have just now described, the cure of a stump was always a work of length of time, for by cutting down to the bone at once, and sawing it directly, the consequence was, that the skin and flesh withdrew themselves, and left it protruding out of the wound two or three inches in some cases; so that it rarely happened that an exfoliation did not follow, which besides being tedious, also frequently reduced the wound to

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an habitual ulcer, and at beſt, left a pointed ſtump, with a cicatrix ready to fly open upon the leaſt accident; all which inconveniencies are avoided by this new method; and I know not of any objection to it, unleſs that the pain of making the wound, is ſuppoſed to be twice as much as in the other, becauſe of the double inciſion; but when we conſider that we only cut the ſkin once, and the fleſh once, though not in the ſame moment, I fancy upon reflection, the difference of pain will be thought inconſiderable.

It muſt be confeſſed, however, that notwithſtanding we derive ſuch benefits from the double inciſion, the contractile diſpoſition of the muſcles, and perhaps of the ſkin itſelf, is ſo great, that in ſpite of any bandage, they will retire from the bone, eſpecially in the thigh, and ſometimes render the cure tedious.

To remove this difficulty, I have lately in amputations of the thigh, made uſe of the croſs-ſtitch, which I would adviſe to be applied in the following manner:

Take a ſeton needle, and thread it with about eight threads of coarſe ſilk, ſo that when they are doubled, the ligature will conſiſt of ſixteen threads, about twelve or fourteen inches long; wax it pretty much, and range the threads ſo that the ligature may be flat, reſembling a piece of tape, after which, oil both it and the needle: the flatneſs of the ligature will prevent its wearing through the ſkin ſo faſt as it would do if it was round, and the oil will facilitate its paſſage: then carry the needle through the ſkin, at about an inch from the edge of the ſtump, and out again on the inſide of the ſtump; after which it muſt be paſſed through the oppoſite ſide of the ſtump, from within outward, exactly at the ſame diſtance from the lips of the wound; this done, the ſilk is to be tied in a bow-knot. With another needle and ſkain of ſilk, the ſame proceſs is to be repeated, in ſuch manner that the ligatures may cut each other at right angles. If it is a large thigh, the lips of the wound may be made to approach each other ſo nearly, as that the diameter of the wound may be about two inches long; but in this, and in all other ſtumps, the approximation of the lips will depend upon the laxneſs of the ſkin, and the quantity preſerved by an artful double inciſion; for the ſkin muſt not be drawn together ſo tight as to put it upon the ſtretch, leſt it ſhould bring on an inflammation and pain.

The manner of applying the croſs-ſtitch, after the amputation of a leg, has nothing particular in it, only that the threads muſt be carried between the tibia and fibula, rather than directly over the tibia: and before the ſkin is drawn over the end of the ſtump, it will be proper to lay a thick doſſil of lint on the edges of the tibia, in order to prevent them from wounding the ſkin. The dreſſings muſt be ſuperficial; and to preſerve the wound clean, an injection of barley water, or warm milk, may be thrown in, with a ſmall ſyringe, between the ſtitches, which will prevent any matter from harbouring there.

I have adviſed the ſkains of ſilk to be tied in a bow-knot, that in caſe of an hæmorrhage, they might be undone, in order to diſcover the veſſels more eaſily, and alſo, if any tenſion ſhould enſue, that they might be looſened for three or four days, and then tied again when the ſuppuration comes on, and the parts are more at liberty.

Perhaps it may be objected that the double inciſion is of itſelf ſufficient for anſwering the ends propoſed by this meaſure; but whoever is converſant in this branch of practice, muſt know, that notwithſtanding the lax ſtate of the ſkin and muſcles at the time of the operation, yet ſome days after they fall conſiderably back from the bone, and in the thigh particularly, ſo much that no bandage will ſuſtain them; the conſequence of which

which is, a proportionable largeneſs of wound, a tedioufneſs of cure, and ſome degree of pointedneſs in the ſtump. It may be obſerved too, that the ſtrictneſs of bandage employed for ſupporting the ſkin and muſcles of the thigh, is not only painful, but in all probability may obſtruct the cure of the wound by intercepting the nutrition; for it is certain, that by long continuance it often waſtes the ſtump, and I am jealous it may alſo be acceſſary to thoſe abſceſſes, which ſometimes form amongſt the muſcles in different parts of the thigh.

The queſtion then remaining is, whether theſe ſtitches will ſupport the ſkin and muſcles more effectually than bandage, without producing ſome new evil, a point which can only be decided by experiment. It is true that this very method was followed by ſome of our anceſtors, and the objections to it have abſolutely prevailed over the arguments in favour of it; for few people now even know it ever was practiſed. Yet I cannot help imagining that caprice may have had more ſhare in utterly diſcarding this method, than reaſon and obſervation; for it is poſitively ſaid, by ſome of the moſt able and candid practitioners, to have ſucceeded marvelouſly; and as the inflammation and ſymptomatic fever ſuppoſed to be excited by it, were always relievable by cutting or looſening the ſtitches, there does not ſeem to have been reaſonable grounds for wholly giving up ſuch great advantages.

But if the objections to it were of force, when the ſingle inciſion was practiſed, they diminiſh exceedingly now that we perform the operation by the double inciſion; for though the double inciſion does not wholly prevent the withdrawing of the muſcles from the bone, yet it abates the degree of it ſo much, that they can ſuffer the ſtitches, without incurring either inflammation or pain, to which they were much more liable after the ſingle inciſion. It muſt be remarked however, that they draw with that ſtrength as to make the ſtitches wear the ſkin and fleſh in twelve or fourteen days but this is done ſo gradually, that it cauſes very little pain or inflammation, and though they conſequently come off with the dreſſings, yet by this time the ſkin and muſcles are fixed; and a ſlight bandage will be ſufficient to maintain them in the ſame poſition.

The two greateſt objections I know of, to this method, are, the deformity of the ſtumps, and the additional pain of the operation; but as a ſtump is not expoſed to view, after the cure, its want of beauty is of no great conſequence; and though it muſt be granted that the ſtitches cannot be made without ſome pain, perhaps it will not be found ſo bad as one is apt at firſt to ſuggeſt; for the mere paſſing of a large needle through the fleſh without making a ſtricture, is very bearable in compariſon of a tight ligature: but whatever be the increaſe of pain for the preſent, the future eaſe in conſequence of it is an ample compenſation; and, if I am not miſtaken, there is ſtill another conſideration of a much higher importance than any I have mentioned, I mean a leſs hazard of life.

For the ſymptomatic fever, and the great danger of life attendant upon an amputation, do not ſeem to proceed purely from the violence done to nature by the pain of the operation, and the removal of the limb; but alſo from the difficulties with which large ſuppurations are produced; and this is evident from what we ſee in very large wounds that are ſo circumſtanced as to admit of healing by inoſculation, or as ſurgeons expreſs it, by the firſt intention; for, in this caſe, we perceive the cure to be effected without any great commotion, whereas the ſame wound, had it been left to ſuppurate, would have occaſioned a ſymptomatic fever, &c. but in both inſtances, the violence done by the mere operation is the ſame, whether the wound be ſewed up or left to digeſt.

Upon

Upon this principle, we may account for the diminution of danger, by following the method here proposed; because as the stitches have a power of holding up the flesh and skin over the extremity of the stump, till they adhere to each other in that situation, they actually do by this means lessen the surface of the wound; in consequence of that, the suppuration; and in consequence of both, the danger resulting from the suppuration.

In amputating the thigh, the first incision is to be made a little more than two inches above the middle of the patella; after the operation, a roller should be carried round the body, and down the thigh, to support the skin and flesh; this is also the most proper bandage, as abscesses will sometimes form in the upper part of the thigh, which cannot discharge themselves so conveniently with any other, it being almost impracticable to roll above the abscess unless we begin from the body.

The amputation of the arm or cubit differs so little from the foregoing operations, that it will be but a repetition to describe it. However, it must be laid down as a rule, to preserve as much of the limb as possible, and in all amputations of the upper limbs, to place your patient in a chair.

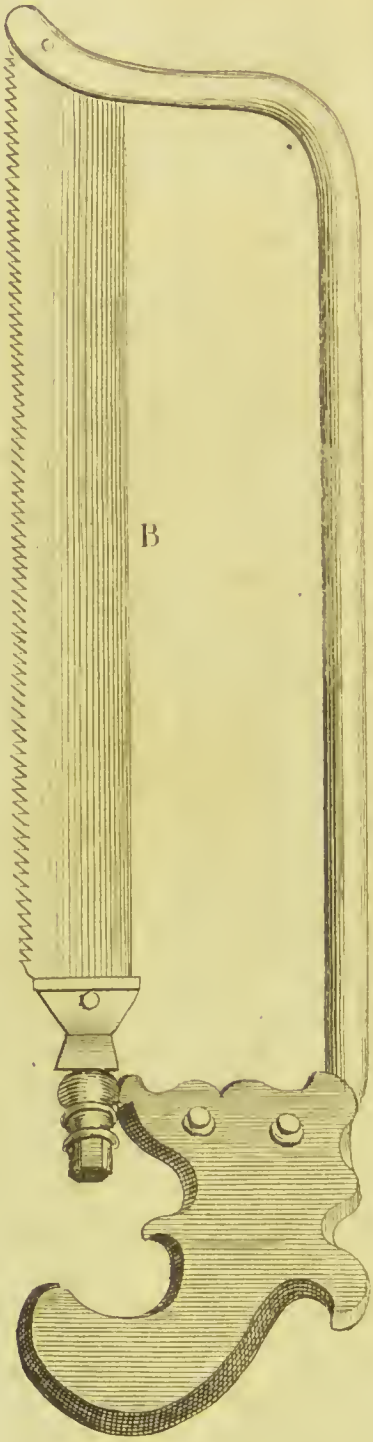
There are in the armies a great many instances of gun-shot wounds of the arm near the scapula, which require amputation at the shoulder; but the apprehension of loosing their patients on the spot by the hæmorrhage has deterred surgeons from undertaking it. I have known where it has been done more than once, with success; but though it had never been performed, we might learn it is practicable, from the case of a poor miller, whose arm and scapula were both torn from his body, by a rope which was accidentally twisted round his wrist, and suddenly drawn up by the mill. Almost every one in London knows the story, and that he recovered in a a few weeks. It is very remarkable in this accident, that after fainting, the hæmorrhage stopped of itself, and never bled afresh, though nothing but lint and turpentine were laid on the great vessels. In case, therefore, of a wound or fracture near the joint, or incurable fistulas in the joint, not attended with much caries, I think the operation may be performed safely in this manner.

The patient being laid on his back, with his shoulder over the edge of the table, make an incision through the membrana adiposa, from the shoulder across the pectoral muscle, down to the arm-pit; and in order to save as much skin as possible, begin it about two inches below the joint; then turning the knife with its edge upwards, divide that muscle, and part of the deltoid; all which may be done without danger of wounding the great vessels, which will become exposed by these openings: if they be not, cut still more of the deltoid muscle, and carry the arm backward: then with a strong ligature, having tied the artery and the vein, carefully divide those vessels at a considerable distance below the ligature, and pursue the circular incision through the joint, cutting first into that part of the bursal ligament which is the nearest to the axilla: for if you attempt to make way into the joint, on the upper part of the shoulder, the projection of the processus acromion, and processus coracoides, will very much embarrass if not baffle the operation. After the amputation, the cross-stitch may be practised here with great benefit.

The amputation of the fingers and toes is better performed in their articulation, than by any of the other methods: for this purpose a great knife must be used, and the incision of the skin be made not exactly upon the joint, but a little towards the extremity of the fingers, that more of it may be preserved for the easier healing afterwards; it will also facilitate the separation in the joint, when

you


A


B

you cut the finger from the metatarsal bone, to make two small longitudinal incisions on each side of it first. In these amputations, there is generally a vessel or two that require tying, and which often prove troublesome when the ligature is omitted.

It may happen that the bones of the toes, and part only of the metatarsal bones are carious, in which case the leg need not be cut off, but only so much of the foot as is disordered; a small spring-saw is better to divide with here, than a large one: when this operation is performed, the heel and remainder of the foot will be of great service, and the wound heal up safely, as I have found by experience.

PLATE XIV.

THE EXPLANATION.

A. The figure of the amputating knife. The length of the blade and handle should be about thirteen inches.

B. The figure of the saw used in amputating the limbs. The length of the handle and saw should be about seventeen inches.

CHAP. XXXVIII.

OF INOCULATION.

IT is usual to prepare the patient for this operation by diet and evacuations, which, according to the habit of body, are to be more or less severe. Some physicians recommend frequent bleedings and purgings, with a strict milk diet, the preceding two months; others a regimen of mercurial alteratives, with gentle purges at proper intervals, for the same length of time; but I think those of the greatest eminence in London, seldom prescribe bleeding more than once, and frequently not at all, trusting to an abstemious course of life, and two or three gentle purges, and sometime to one only, the week before the operation, at least where the subject is young.

The proper time for inoculation is generally supposed to be infancy; and some think the earlier the better; but as children the first two or three years of their life, are subject to many terrible disorders from the circumstance of breeding their teeth, and indeed seem more liable to fatal convulsions upon the eruption of the small-pox, than after that time, I believe it is advisable to postpone the operation till they are three or four years old; when probably, the longer it is deferred, so much the worse; though the success of this practice has been surprising, even in the most advanced age.

Physicians have not unanimously determined which is the preferable part for inoculation, the arms or legs; and some order the operation to be performed in one of each: in either case, it is right to do it in two places; though probably it will not be absolutely necessary; but as one of the applications may by accident fall off, or slip on one side from the orifice, the other will generally take effect, and prevent a disappointment. The practice of inoculating in the legs, is preferred to the other method by some, from an observation that the incisions in these parts are more disposed to ulcerate than those in the arms, which circumstance they imagine to be advantageous, upon a persuasion it makes a powerful revolution of the morbid matter from the face and throat: on the contrary, the advocates for inoculating in the arms, advise it for the very reason that the orifices are less liable to become sore and painful; alledging, that the discharge from the wounds cannot be favourable to the eruption, since it seldom happens till the pustules appear, and are even ripe; or should it be judged necessary from the nature of the distemper, or the patient's constitution, to continue the discharge, still it may be done as efficaciously in the

the arms, by converting one or both incifions into an iffue. Thefe confiderations have induced the generality of phyficians to approve of this laft method.

The operation is to be performed after this manner: you muft, with a ftocking needle, prick five or fix large puftules on the arm or leg of the fubject you inoculate from, when they are plumpeft, and the diftemper is at its height; then taking a few threads of lint, roll them up fo as to make one thread of the thicknefs of fine worfted: draw this over the orifices made into the puftules, till a fufficient quantity of it is moiftened by the matter iffuing out of them. Cut this thread into pieces of the length of a barley-corn, and put them immediately into a little box or bottle, which fhould be fhut up clofe; and though perhaps the matter may retain its efficacy for many hours or days, yet it is advifeable to ufe it as foon as poffible. It would be of no importance what part of the arms or legs were to receive the infection, but that a drain may be defirable after the illnefs; and therefore the incifions fhould be in thofe places where iffues are generally ordered, that by putting in a pea, you may at pleafure procure a difcharge from them as long as you fhall think proper, a month, two months, or more: the orifices fhould be cut with a lancet the length of a barley-corn, and fo fhallow, as barely to fetch blood; the pieces of lint muft be laid exactly on them, and fecured in their fituation by a ticking-plafter and bandage; this application fhould remain twenty-four or thirty-fix hours, and afterwards the orifices may be treated every day with digeftives, or other medicines, according to their degree of inflammation, ulceration, and pain. After the operation, the patient muft be confined, and live low till the time of the eruption, which is ufually about the eighth or ninth day, when the diftemper is to be managed as in the ordinary method.

It is imagined by fome, that the matter from an inoculated fubject, is lefs malignant than from a perfon who has the diftemper, however mildly, in a natural way; but I think there is not a fufficient foundation for this opinion: it is without doubt proper to take it from a kind fort of a healthy fubject; and though it is not probable any other conftitutional illnefs will be communicated with the fmall-pox by inoculation, rather than by the natural way, which nobody even fuggefts; yet, as we may have choice of patients to borrow it from, we fhould not run any rifk, but fix on fuch, if poffible, who are under nine or ten years of age, and whofe parents have always been healthy as well as themfelves.

It may not be amifs to obferve, that upon the introduction of the practice of inoculation into England, among the many popular prejudices which prevailed againft it, there was none of fuch feeming weight, as the opinion that it did not abfolutely fecure the patient from contracting the diftemper again in the natural way; but length of years, and a ftrict enquiry, have at laft entirely falfified this doctrine, among men of learning and candour. Great improvements have been made in England fince the publication of the foregoing chapter, both in the method of inoculating, and the manner of treating the diftemper; but as they are defcribed with great precifion by Baron Dimfdale, I fhall refer the reader to his pamphlet on this fubject.

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THE ANATOMY OF THE HUMAN BONES, NERVES, AND LACTEAL SAC AND DUCT.

By ALEXANDER MONRO, Senior,
M. D. and F. R. S.
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,
AND
PROFESSOR OF MEDICINE AND ANATOMY IN THE UNIVERSITY OF EDINBURGH.

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TO THE

STUDENTS OF ANATOMY,

IN THE

UNIVERSITY OF EDINBURGH.

GENTLEMEN,

WHEN this Osteology was first printed in 1726, I did not know that Albinus, Winslow, and Palfyn, were to publish descriptions of the bones; otherwise my papers probably would have remained yet undelivered to the printers. I however flatter myself, that this essay has been of use to the gentlemen who did me the honour to attend my lectures, by assisting them to understand my sense and representation of things in this fundamental part of anatomy; and that it has possibly been of more advantage to them than a more complete work from an abler hand, unless my demonstrations had been in the order and method of such an author.

This view of your improvement, gentlemen, is a prevailing argument with me to cause this essay to be reprinted; and you cannot reasonably blame me, if I likewise acknowledge another motive for it, which more particularly relates to myself. In a new edition, an author has an opportunity of making his works more correct, complete, and consequently acceptable to the public, who may, perhaps, be indulgent enough to think this little treatise not altogether useless; since more reasoning on the structure of morbid phænomena of bones is to be found in it, than in the other writers, who have confined themselves almost entirely to the descriptive or proper anatomical part of the osteology.

I have

I have here kept to the plan of the former editions, by firſt conſidering, in the order that ſeemed to me moſt natural and methodical, every thing which I thought neceſſary to be known concerning bones in general; and, in the ſecond part, I have deſcribed the ſeveral bones compoſing the ſkeleton.

The bones of adults are what I principally endeavour to deſcribe; but I have added as much of the oſteogenea as I think ſerviceable in the practice of phyſic and ſurgery.

That little might be omitted of what was formerly done on this ſubject, I have taken all the aſſiſtance I could from books; but have never aſſerted any anatomical fact on their authority, without conſulting nature, from which all the deſcriptions are made; and therefore the quotations from ſuch books, ſerve only to do juſtice to the authors who have remarked any thing in the ſtructure of the parts that was commonly omitted, and to initiate you in the hiſtory of anatomy, which I once propoſed to make complete, ſo far as related to this ſubject; but not being able to procure ſeveral books, and being ſenſible how much more may have never come to my knowledge, I laid aſide this deſign, of purpoſe omitted many I could have inſerted, and in ſome places I have changed an older author for a later one, who has more fully or clearly deſcribed what I treated of. Beſide anatomiſts, I have alſo named ſeveral other authors, to confirm my reaſoning by practical caſes, of which it is not to be ſuppoſed my own experience could furniſh a ſufficient variety.

You will readily obſerve, that I quote no paſſages with a view to criticiſe or condemn them. This precaution of giving no offence, is very neceſſary in thoſe who are ſufficiently conſcious of their being liable to lay themſelves open to juſt cenſure; and it prevents occaſions of uſeleſs wrangling, in which generally both parties are loſers, and the public has little advantage.

In this treatiſe I always make uſe of the moſt common name of each part, and have put the ſynonimous names to be met with in books, at the foot of the page, that the reading might be ſmoother, and you might conſult them at your leiſure, to aſſiſt you in underſtanding different authors.

The deſcriptions and reaſoning are here blended; without which I always find young anatomiſts are ſoon diſguſted with

authors:

authors: their imaginations cannot follow a long chain of deſcriptions, eſpecially when they are not taught at the ſame time the uſes which the deſcribed parts ſerve: their minds muſt have ſome relaxation; by a mixture of reaſoning, which never miſſes to ſtrike the fancy agreeably, and raiſes a ſtrong deſire to underſtand the principles on which it depends.

The phænomena of diſeaſes are all deduced in this eſſay from the ſtructure of the parts, by way of corollaries and queſtions, which ſuch an anatomical work confined me to: And this method has otherwiſe a good effect; for when one meets with an uſeful propoſition, and is obliged to employ a little thought to find out its ſolution, the impreſſion it makes is deeper, and he acquires a fondneſs for it, as being in part his own diſcovery. My pupils have frequently aſſured me, that they could, with very ſmall reflection, trace out the whole reaſoning from which my concluſions were drawn; I hope their ſucceſſors will alſo think this an agreeable manner of being inſtructed.

Thoſe gentlemen who deſired I would add the lectures which I pronounce in my colleges as a commentary upon the text, where the diſeaſes are mentioned, will, I perſuade myſelf, excuſe me for not complying with their deſire, when they conſider the deſign of this is to be a ſchool-book, and how great the difference is between inſtructing youth in private, and pretending to inform the public. Art. xxiv. Vol. v. of Medical Eſſays and Obſervations, publiſhed in this place, is one of theſe lectures which I give as a commentary on the paragraph (p. 11) concerning the different kinds of caries.

In this edition, I have corrected the miſtakes and obſcure paſſages which I diſcovered in the former, and in ſome places I have made the deſcriptions more full and exact, aiming all I could to ſhun unneceſſary minuteneſs on the one hand, and a blameable inaccuracy on the other: whether I have hit that juſt medium, is what you and the public muſt now judge.

I am ſtill of opinion, that figures of the bones would at any rate have been unneceſſary, in a book that is intended to be illuſtrated and explained by the originals themſelves; but would be much more ſo now, when my late ingenious friend Mr. Cheſelden, Dr. Albinus, and Mr. Sue,* have publiſhed ſuch elegant ones.

* Traite d'oſteologie, traduit de l'Anglois de M. Monro, ſeconde partie.

You have advantageous opportunities in this place of ſtudying all parts of medicine, under the profeſſors of its different branches in the univerſity, and of ſeeing the practice of pharmacy, ſurgery, and phyſic, with our ſurgeon-apothecaries, and in the Royal Infirmary, where the diſeaſed poor are carefully treated. Theſe your intereſt, and I hope your inclination, will lead you, gentlemen, ſo to improve, as that they may become the happy means of your making a conſiderable figure in your ſeveral ſtations. Whatever aſſiſtance is in my power towards ſuch a deſirable event, ſhall be given with the greateſt pleaſure by

Your humble ſervant,

ALEXANDER MONRO.

THE

THE ANATOMY OF THE HUMAN BONES.

PART I.

OF THE BONES IN GENERAL.

BONES are covered by a membrane, named on that account, *Periosteum*,* which is so necessary to them, that we must examine its texture and uses, before we can understand their structure.

The periosteum, as well as most other membranes, can be divided into layers of fibres. The exterior ones, composed of the fibres of the muscles connected to the bones, vary in their number, size, and direction, and consequently occasion a very great difference in the thickness and strength of the periosteum of different bones, and even of the different parts of the same bone. The internal layer is every where nearly of a similar structure, and has its fibres in the same direction with those of the bone to which they are contiguous. Ought not then the name *Periosteum* to be applied, strictly speaking, only to this internal layer, to which the others are joined in an uncertain manner and number?

Some authors* endeavour to prove the internal layer of fibres of the periosteum, to be derived from the dura mater; for, say they, since the membrane covering the scull, is plainly a production or continuation of the dura mater, which passes out between the sutures; and since there are muscles on the head, as well as in other parts, which might furnish a periosteum, it is needless to assign different origins to membranes which have the same texture and uses. They add farther, in proof of this doctrine, that the periosteum extends itself along the ligaments of the articulations from one bone to another, and therefore is continued from its origin over

* Membrana circumossalis, omentum ossibus impositum.

* Havers, Osteology, nov. disc. 1. page 16.

over all the bones of the body. While anatomists were fond of the hypothesis of all membranes being derived from one or other of the two that cover the brain, a dispute of this kind might be thought of consequence: but now that the hypothesis is neglected as useless, it is needless to examine the arguments for and against it.

Except where muscles, cartilages, or ligaments, are inserted into the periosteum, its external surface is connected to the surrounding parts by thin cellular membranes, which can easily be stretched considerably, but shorten themselves whenever the stretching force is removed. When these membranes are cut off or broken, they collapse into such a small space, that the surface of the periosteum seems smooth and equal.

When we attempt to tear off the periosteum from bones, we see a great number of white threads produced from the membrane into them: and after a successful injection of the arteries with a red liquor, numerous vessels are not only seen on the periosteum,* but most of the fibres sent from the membrane to the bone, shew themselves to be vessels entering it, with the injected liquor in them; and when they are broken, by tearing off the periosteum, the surface of the bone is almost covered with red points.

The veins corresponding to these arteries, are sometimes to be seen in subjects that die with their vessels full of blood; though such numerous ramifications of them, as of the arteries, can seldom be demonstrated, because few of them naturally contain coloured liquors, and such liquors can difficultly be injected into them. This, however, is sometimes done. †

The great sensibility of the periosteum in the deep-seated species of paronychia, in exostoses, nodi, tophi, and gummata, from a lues venerea, or whenever this membrane is in an inflamed state, is a sufficient proof that it is well provided with nerves, though they are perhaps too small to be traced upon it; and therefore cannot well determine, whether they are sent along with the arteries in the common way, or are derived from the tendinous fibres of the muscles expanded on the periosteum.*

Vessels also pass through the periosteum to the marrow; of which more hereafter. And frequently muscles, ligaments, or cartilages, pierce through the periosteum, to be inserted into the bones.

The chief uses of the periosteum are, 1. To allow the muscles, when they contract or are stretched, to move and slide easily upon the bones; the smooth surface of this membrane preventing any ill effects of their friction upon each other. 2. To keep in due order, and to support, the vessels in their passage to the bones. 3. By being firmly braced on the bones, to assist in setting limits to their increase, and to check their overgrowth. 4. To strengthen the conjunction of the bones with their epiphyses, ligaments, and cartilages, which are easily separated in young creatures, when this membrane is taken away. 5. To afford convenient origin and insertion to several muscles which are fixed to this membrane. And, lastly, to warn us when any injury is offered to the parts it covers; which, being insensible, might otherwise be destroyed without our knowledge, or endeavouring to procure a remedy.

When the cellular substance connecting the periosteum to the surrounding parts is destroyed, these parts are fixed to that membrane, and lose the sliding motion they had upon it; as we see daily in issues, or any other tedious suppurations near a bone.

* Ruysch. Epist. 5. tab. 5. fig. 1, 2. Epist. 8. tab. 6. fig. 1. 6.

† See traite d'osteologie, traduit de l'Anglois de Mr. Monro. Note in page 9.

* See the dispute about the sensibility of this and of other membranes in Zinnerman. Dissert. de irritabilit. Act. Gotting. vol. 1. Haller sur la nature sensible et irritable. Whytt's physiciog. essay II. Remar. Dissert. de fungo articulor. sect. 26. 34.

When

When the veſſels which go from the perioſteum to the bones are broken or eroded, a collection of liquor is made between them, which produces a ſordid ulcer or rotten bone. This often is the caſe after fractures of bones, and inflammations of the perioſteum, or after ſmall-pox, meaſles, ſpotted fevers, and eryſipelas. Do not the diſorders of the perioſteum, coming rather along with, or ſoon after, the cutaneous than other diſeaſes, indicate ſome ſimilarity of ſtructure in the perioſteum and ſkin?

The bones are the moſt hard and ſolid parts of the body, and, as all other parts where large veſſels do not enter, are generally of a white colour; only in a living creature they are blueiſh, which is owing to the blood in the ſmall veſſels under their ſurface. The leſs therefore and fewer the veſſels are, and the thicker and firmer the bony ſurface covering the veſſels is, the bones are whiter. Hence the bones of adults are whiter than thoſe of children; and, in both young and old, the white colour of different bones, or of the ſeveral parts of the ſame bone, is always in proportion to their veſſels and ſolidities; which circumſtances ought to be regarded by ſurgeons, when they are to judge of the condition of bones laid bare.

Bones are compoſed of a great many plates,* each of which is made up of fibres or ſtrings united by ſmaller fibres;† which being irregularly diſpoſed, and interwoven with the other larger fibres, make a reticular work. This texture is plainly ſeen in the bones of fœtuſes, which have not their parts cloſely compacted, and in the bones of adults which have been burnt, long expoſed to the weather, or whoſe compoſition has been made looſe by diſeaſes. The chinks which are generally made according to the direction of the larger fibres of bones that have undergone the action of fire, or of the weather, ſhew the greater ſtrength of theſe than of the fibres which connect them. Numerous accurate obſervations of the different times in which exfoliations are made from the ſides or ends of ſimilar bones, might bid fair to determine what is the proportional force of coheſion in the two ſorts of fibres.

The plates are ſaid * to be firmly joined to each other by a great number of claviculi, or ſmall bony proceſſes, which, riſing from the inner plates, pierce through ſome, and are fixed into the more external ones. Of theſe nails, four kinds, viz. the perpendicular, oblique, headed, and crooked have been deſcribed: but in bones fitly prepared, I could only ſee numerous irregular proceſſes riſing out from the plates.†

Though the exterior part of bones is compoſed of firm compact plates, yet they are all more or leſs cavernous internally. In ſome (*e. g.* middle thin part of the ſcapula and os ilium) the ſolid ſides are brought ſo near, that little cavity can be ſeen; and in others (middle of os humeri, femoris, &c.) the cavities are ſo large, that ſuch bones are generally eſteemed to be hollow or fiſtular. But the internal ſpongy texture is evident in young animals; and ſome of it may be ſeen to remain in thoſe of greateſt age, when bones are cautiouſly opened after they have been kept ſo long as to be free of the oil they contain, or after being burnt.

This ſpongy cavernous internal part of bones, is generally called their *Cancelli* or *Lattice-work*, and is formed in the following manner: The plates are firmly joined about the middle of the bone; but as they are extended towards its ends, the more internal plates ſeparate from the exterior, and ſtretch out their fibres towards the axis of the bone, where they are interwoven with the fibres of other plates that have been ſent off in the ſame way. Seeing the plates are thus conſtantly going off, the ſolid ſides

* Squamæ bracteæ, laminæ.
† Malpigh. Anat. plant. et. oper. poſthum.

* Gagliard. Anat. oſſium. nov. invent. illuſtrat. cap. 1. abſ. 2.
† Malpigh. oper. poſthum.

of

of the bones muſt become thinner, and the lattice-work muſt be thicker and ſtronger towards their ends. This is evident in many of them, where the ſolid ſides of their middle are very thick, and the cancelli are ſcarce obſervable; whereas, at the ends, where their diameter is greateſt, the ſolid walls or ſides are not thicker than paper, and the cancelli are numerous and large enough to fill up the whole ſpace left between the ſides.

The twiſting and windings which theſe cancelli make, and the interſtices which they leave, differ conſiderably in figure, number, and ſize; and therefore form little cells, which are as different, but communicate with each other. Some writers * minutely remark theſe different appearances of the cancelli, after they begin to ſeparate from the plates; and from thence diſtinguiſh them into wrinkled, perforated, and net-like.

The cancelli ſuſtain the membranous bags of the marrow which are ſtretched upon them, and thereby hinder theſe membranous parts to be torn or removed out of their proper places, in the violent motions and different poſtures which the bones are employed in. This ſupport which the cancelli afford the marrow, alſo ſaves its membranes and veſſels, in the lower parts of the bones, from being compreſſed by the weight of the marrow above.

The depreſſions between the fibres of the external plates of bones appear like ſo many furrows on their ſurface, into each of which the perioſteum enters; by which the ſurface of contact, conſequently the coheſion, between it and the bone, is conſiderably increaſed, and a greater number of veſſels is ſent from it into the bone, than if it was a plain ſurface.

Both on the ridges and furrows, numerous little pits or orifices of canals are to be ſeen, by which the veſſels paſs to and from the bones.

After a ſucceſsful injection, the arteries can be traced in their courſe from the pits to the plates and fibres; and, in ſawing, cutting, or raſping the bones of living creatures, theſe veſſels diſcover themſelves by the ſmall drops of blood which then ouze out from the moſt ſolid part of the bones. But the cleareſt demonſtration of the intimate diſtribution of theſe ſmall arteries, is to obſerve the effect of ſuch a tingeing ſubſtance as can retain its colour, when ſwallowed, digeſted, and mixed with the blood of any living animal, and at the ſame time has particles ſmall enough to be conveyed into the veſſels of the bones; ſuch is rubia tinctorum, madder root:* —For we ſee the gradual advances which this tincture makes from the perioſteum into the more internal parts of the bones, and how univerſally the diſtribution of the liquors is made, the whole bony ſubſtance being tinged. Whether the time in which this tinged liquor paſſes from the outer to the internal plates, till all the plates are made of its colour, and the time which the diſappearing of the dye, after giving the creature no more of this ſort of food, makes us think it takes to return, are the ſame in which the natural liquors circulate, is uncertain; becauſe this tingeing ſubſtance may move more ſlowly, or may paſs more quickly, than the natural liquors do.——The arteries are larger near each end, than at the middle, of the large bones that are much moved; becauſe they not only ſerve the bony plates near the ends, but paſs through them to the marrow.— As animals advance in age, the arteries of the bones become leſs capacious; as is evident, 1. From the bones of adults having leſs blood in them than thoſe of children have. 2. From many of them becoming incapable in old age of admitting the coloured powders uſed in injections, which eaſily paſs in youth. And, 3. From the bones of old creatures being more difficultly tinged with madder than thoſe of young ones If an

* Gagliar. Anat. oſſium. cap. 1. obſ. 4 5, 6, 7.

* Philoſoph. Tranſact. num. 442. art. 8 num. 443, art. 2. num. 457. art. 4. Mem de l'Acad. des ſciences, 1739, 1742.

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thors have not mistaken, the arteries of bones have sometimes become very large.*

We may conclude, from arteries being accompanied with veins so far as we can trace them in every other part of the body, that there are also veins in the bones; and the disappearing of the tincture of madder, after bones of living animals are coloured with it, could not be without such veins to carry it away; nay, the veins of bones can sometimes be injected and then seen.†

The bones of a living animal are so insensible, that they can be cut, rasped, or burnt, without putting the creature to pain, and the nerves distributed in their substance cannot be shewn by dissection; from which it might be inferred that they have no nerves distributed to them: But the general tenor of nature, which bestows nerves to all the other parts, should prevent our drawing such a conclusion. And if sensibility is a sure proof of nerves entering into the composition of any part, as it is generally allowed to be, we have sufficient evidence of nerves here in the bones; for the granulated red flesh which sprouts out from them, after an amputation of a limb, or performing the operation of the trepan, or after an exfoliation, is exquisitely sensible: And, in some ulcers of bones, where the periosteum was all separated, the patient suffered racking pain, if the bone was touched with a rough instrument; nor was he free of pain after the bone was perforated.‡

The reason why the nerves of rigid hard bones become insensible, is, that all nerves must have a considerable degree of flexibility at the part where objects are applied, otherwise it cannot be affected by their impressions. We see this illustrated in a very common analogous case, the growth of a new nail: When the former one has suppurated off, the thin membrane which first appears, is exquisitely sensible; but gradually becomes dull in its sensation, till it can be cut or scraped, without causing pain, after it is formed into a hard nail.

From what has been said of the vessels of bones, it is evident, that there is a constant circulation of fluids in every part of them; and that there is a perpetual waste and renewal of the particles which compose the solid fibres of bones, as well as of other parts of the body; the addition from the fluids exceeding the waste during the growth of the bones; the renewal and waste keeping pretty near par in adult middle age; and the waste exceeding the supply from the liquors in old age; as is demonstrable from their weight: for each bone increases in weight, as a person approaches to maturity; continues of nearly the same weight till old age begins, and then becomes lighter. The specific gravity of the solid sides, on the contrary, increases by age; for then they become more hard, compact, and dense. In consequence of this, the bones of old people are thinner and firmer in their sides, and have larger cavities than those of young persons.

The vascular texture of bones must make them subject to obstructions, ecchymoses, ulcers, gangrenes, and most other diseases which the foster parts are affected with; and therefore there may be a greater variety of caries than is commonly described.*

Hence we can account for the following appearances:

Hæmorrhages from fungous flesh rising out from the most solid part of a cut bone.†

The regular alternate elevation and subsiding, or apparent pulsation, frequently to be seen in some of the cells of a carious bone.

Cells resembling cancelli, sometimes seen in the part of a bone, which, in a natural

* Diemerbrock, Anat. lib. 9. cap. 1. Mery. Hist. de l'Acad. des sciences, 1704.

† Sue trad. d'osteolog. p. 9.

‡ Nicol. Massa, lib. introd. anat. cap. 30.

* Edinburg Medical essays and obs. vol. 5, art. 25.

† Medical essays, vol. 4. art. 21.

natural ſtate, is the moſt ſolid and firm.*

A bone has a tube including another bone within it.†

On the internal ſurface of the ſolid parts of bones, there are orifices of canals, which paſs outwards through the plates to open into other canals that are in a longitudinal direction, from which other tranſverſe paſſages go out to terminate in other longitudinal canals; and this ſtructure is continued through the whole ſubſtance of bones, both theſe kinds of canals becoming ſmaller gradually as they approach the outer ſurface.‡ Theſe canals are to be ſeen to the beſt advantage in a bone burnt till it is white: When it is broken tranſverſly, the orifices of the longitudinal canals are in view; and when we ſeparate the plates, the tranſverſe ones are to be obſerved. Here however we are in danger of believing both theſe ſorts of canals more numerous than they really are; becauſe the holes made by the proceſſes connecting the plates of bones, have the appearance of the tranſverſe;‖ and the paſſages for the blood-veſſels reſemble the longitudinal canals. I do not know how we are to keep free of error about the tranſverſe canals; but think we may diſtinguiſh between the two kinds of longitudinal ones; for the paſſages of the veſſels are largeſt near the external ſurface of the bone, and every tranſverſe ſection of them is circular; whereas the longitudinal canals are largeſt near the cancelli, and their tranſverſe ſections appear to me of a flat oval figure, which may be owing to the different momentum of the fluids conveyed in them. The ſituation of the larger longitudinal canals, and of the paſſages of the larger veſſels, make a bone appear more denſe and compact in the middle of its ſolid ſides, than towards its outer and inner ſurfaces, where it is ſpongy.

* Ruyſch. Theſ. 8. num. 8. Theſ. 10 num. 176.

† Idem, ibid.

‡ Havers Oſteolog. nov. p. 43.

‖ Morgagn: Adverſ. 2. animad: 25.

We ſee marrow contained in the larger tranſverſe and longitudinal canals juſt now deſcribed, and from thence judge that it paſſes alſo into the ſmaller ones. The drops of oil which we diſcover with a microſcope every where on the ſurface of a recent bone, fractured tranſverſly, and the ouſing of oil through the moſt ſolid bones of a ſkeleton, which renders them greaſy and yellow, are a confirmation of the uſe of theſe canals. Of what advantage this diſtribution of the marrow through the ſubſtance of bones is, will be mentioned when the nature and uſe of this animal oil is inquired into.

Moſt bones have one or more large oblique canals formed through their ſides for the paſſage of the medullary veſſels, which are to be deſcribed afterwards.

Bones expoſed to a ſtrong fire in chemical veſſels, are reſolved, in the ſame manner as the other parts of animals, into phlegm, ſpirit, volatile ſalt, fetid oil, and a black caput mortuum. But the proportion of theſe principles varies according to the age, ſolidities, and other circumſtances of bones. Young bones yield the largeſt proportion of phlegm; ſpongy bones afford moſt oil, and ſolid ones give moſt ſalt and black reſiduum. Though this reſiduum can ſcarce be changed by the force of fire while it is in cloſe veſſels; yet, when it is burnt in an open fire, the tenacious oil, to which it owes its black colour, is forced away, and a white earth is left that has little or no fixed ſalt in it. This earth ſeems to be the proper conſtituent ſolid part of bones, and the other principles give it firmneſs and tenacity: For the quantity of the earth is ſo great, that, after all the other principles are ſeparated from a bone, its former ſhape and ſize remain;* but it is very brittle till it is moiſtened with water or oil, when it recovers ſome tenacity. The increaſe of the proportion of earth in old people's bones is one reaſon of their being

* Havers Oſteolog. nov. diſc. 1. p. 32.

more

more brittle than those of young people are.

Let any imagine the salts and oils of bones, while in a natural state, to be of the same acrid kind with those obtained from them by the chemical analysis, it is to be observed, that these principles may be extracted from bones in the form of a very mild jelly, by boiling them in water.

The bones sustain and defend the other parts of the body.

Bones are lined within, as well as covered externally, with a membrane; which is therefore commonly called *Periosteum internum*.

The internal periosteum is an extremely fine membrane; nay, frequently it has a loose reticular texture; and therefore it is compared by some to the arachnoid coat of the spinal marrow; so that we cannot expect to divide it into layers as we can divide the external periosteum. We can however observe its processes entering into the transverse pores of the bones, where probably they are continued to form the immediate canals for the marrow distributed through the substance of the bones; and along with them vessels are sent, as from the external periosteum, into the bone.* These processes being of a very delicate texture, the adhesion of this membrane to the bone is so small, that it separates commonly more easily from the bone than from the marrow which it contains: wherefore, one might call it the common membrane of the marrow, rather than by the name it now has. But whether one or the other designation ought to be given it, is not worthy a dispute.

From the internal surface of the internal periosteum, a great number of thin membranes are produced, which passing across the cavity, unite with others of the same kind, and form so many distinct bags, which communicate with each other; and these again are sub-divided into communicating vesicular cells, in which the marrow is contained. Hence it is, that the marrow, when hardened, and viewed with a microscope, appears like a cluster of small pearls; and that the hardened marrow of bones buried long under ground, or laid some time in water, and then dried, is granulous.* This texture is much the same with what obtains in the other cellular parts of the body, where fat is collected; only that the cells containing the marrow are smaller than those of the tunica adiposa or cellulosa elsewhere, which probably is owing to their being inclosed in the bones, where they are not so much stretched or extended as in other parts.

The marrow is the oily part of the blood, separated by small arteries, and depositated in these cells. Its colour and consistence may therefore vary according to the state of the vessels, and their distribution on the membranes of the cells.

The marrow, as well as the other fat of the body, chemically analized, yields, besides oil and water, a considerable proportion of an acid liquor, but no alkali.† This may be the reason of its being less putrescent than the blood or most other parts of animals,‡ which is a necessary quality in a substance that is constantly exposed to a considerable degree of heat, and is more in a stagnating condition than the other liquors.

Besides the arteries which I mentioned already (p. 10.) to be sent from the bones to the marrow, there is at least one artery for each bone: several bones have more, whose principal use is to convey and secern this oily matter. After these arteries have pierced the solid side of a bone, they are divided into several branches; which soon are distributed every where on the internal periosteum, and afterwards spread their branches inwards on the medullary cells, and

* Winslow Exposition anat. des os frais, sect. 82. 83.

* Ruysc. Thesaur. 9. num. 2. et Adverf. dec. III. obs. 9.

† Grutzmaker Differt. de ossium medulla. Haller Element physiolog. lib. 4. sect. 4.

‡ Pringle Append. to camp diseases exper. 47.

outwards through the tables of the bone.

The blood which remains after the secretion of the marrow is returned by proper veins, which are collected from the membranes into one or two large trunks, to pass out at the same holes or passages at which the artery or arteries enter.

The general rule of the small vessels decreasing in their capacities as animals advance in age, to which many phænomena in the animal œconomy are owing, obtains here: for though the trunks of the medullary vessels enlarge as animals turn older; yet the small branches become smaller; as is evident from injections, which cannot be made to pass near so far in these vessels of adults as of children. Hence the marrow is bloody in children, oily and balmy in middle age, and thin and wateay in old people.

By experiments made on the marrow, when bones of living animals are opened or cut through, * and from the racking pain with which suppurations within bones are frequently attended, we have sufficient proof that the membranes here are sensible, and consequently have nerves distributed to them. Hippocrates † might therefore say justly, that a wound penetrating into the cavity of a bone may produce a delirium.

The vessels of the marrow, wrapped up in one common coat from the periosteum, pass through the bones by proper canals; the most considerable of which are about the middle of each bone, and are very oblique. Sometimes these vessels continue at a little distance in their passage when the canal is divided by a small bony partition or two.

From the structure of the contents of the bones, we may judge how these parts, as well as others, may be subject to oidema, phlegmon, erysipelas, schirrhus, &c. and may thence be led to a cure of each, before the common consequence, putrefaction, takes place, and frequently occasions the loss of the limb, if not of the patient.

The marrow is of very considerable use to the bones; for, by entering their transverse canals, and passing from them into the longitudinal ones, it is communicated to all the plates, to soften and connect their fibres, whereby they are preserved from becoming too brittle; as we see they do in burnt bones, or those long exposed to the air; in people labouring under old age, pox, or scurvy. In all which cases, the oil is either in too little quantity, or has its natural good qualities changed for worse ones.

Besides this advantage which the substance of bones has from the marrow, their articulations are said * to receive no less benefit from it; for it is thought that the marrow passes into the articular cavities, through the holes which are in the bones near the large joints. And, as a proof of this, it is alledged, that butchers, upon seeing the greater or lesser quantity of marrow in the bones of cows, can tell whether they have travelled far or little before they were slaughtered.

When the marrow, after having served the uses mentioned, is reassumed into the mass of blood (as it is continually, in common with all other secreted liquors that have not passages formed for conveying them out of the body) it corrects the too great acrimony communicated to the saline particles of our fluids by their circulation and heat; in the same manner as lixivial salts are blunted by oil in making soap. Hence, in acute diseases, the marrow, as well as the other fat of the body, is quickly wasted, but must be immediately supplied by liquors from the vessels; seeing the cells within the bones, which have no assistance to their contraction from the pressure of the atmosphere, cannot collapse, as the tela cellularis under the skin does, when the liquor in its cells is absorbed;

* Du Verney, Memoires de l'Acad. des sciences, 1700

† Aphorism, sect. 7. aph. 24.

* Joan de Muralto Vade mecum anat. exercit. 5. sect. 3. Havers Osteolog. nov. disc. 3, p. 179.

ed; the bones therefore are always full.

Since it is the nature of all oils to become thin and rancid when exposed long to heat, and bones have much oil in their firm hard substance, we may know why an ungrateful smell, and dark-coloured thin ichor, proceed more from corrupted bones than from other parts of the body; and we can understand the reason of the changes of colour which bones undergo, according to their different degrees of mortification. Hence likewise we may learn the cause of a spina ventosa, and of the difficulty of curing all caries of bones proceeding from an obstruction, and consequent putrefaction of the marrow; and of the quick pulse, thirst, and hectic paroxysms, so often attending these diseases. These phænomena also teach us the reason of the fatal prognosis taken from black fetid urine in fevers.

Though bones so far agree in their structure and annexed parts, yet we may observe a considerable difference among them in their magnitude, figure, situation, substance, connection, uses, &c. From which authors have taken occasion to distinguish them into as many classes as they could enumerate of these different circumstances. But these being obvious to every person that looks on bones, I shall only mention one of them; which comprehends very near the whole bones of the body, and at the same time leads us to examine the most considerable variety that is to be found in the disposition of their constituent parts, and in their uses. It is this, that some bones are broad and flat, while others are long and round.

The broad bones have thin sides, by the plates being soon and equally sent off to form the lattice-work; which therefore is thicker, and nearly of an equal form all through. By this structure, they are well adapted to their uses, of affording a large enough surface for the muscles to rise from, and move upon, and of defending sufficiently the parts which they inclose.

The round bones have thick strong walls in the middle, and become very thin towards their ends, which is owing to very few plates separating at their middle; where, on that account, the cancelli are so fine and small, that they are not taken notice of: but such bones are said to have a large reservoir of oil in this place. Towards their ends the lattice-work becomes very thick, and rather more complete than in the other sort of bones. These round bones having strong forces naturally applied to them, and being otherwise exposed to violent injuries, have need of a cylindrical figure to resist external pressure, and of a considerable quantity of oil to preserve them from becoming too brittle. Besides which, they are advantageously provided with thick sides towards their middle, where the greatest forces are applied to injure them; while their hollowness increases their diameter, and consequently their strength to resist forces applied to break them transversly.* Thus for instance, in estimating the proportional resistance of two cylindrical bones of unequal diameters, but consisting of an equal number of similar fibres uniformly disposed round each, it is plain,

1. That the absolute force of these two bones is equal, because they consist of equal numbers of similar fibres.

2. That the absolute forces of all the fibres in each bone have the same effect in resisting any power applied to break them, as if the sum of all their forces was united in the respective centres of the transverse sections where the fractures are to be made. For, by hypothesis, the fibres being uniformly disposed in each, there is not any fibre in either bone that has not a corresponding fibre; the sum of both whose distances from the axis of revolution (about which all the parts of the bone must revolve in breaking) is equal to two semi-diameters of the bone: consequently each fibre, may be regarded as resisting at

* Galilei Mechanic. dialog. 2.

the diſtance of one ſemi-diameter or radius from this axis, that is, in the centre.

3. Since the united force of all the fibres is to be regarded as reſiſting at a diſtance from the centre of motion equal to the ſemi-diameter, it follows, that the total reſiſtance of all theſe fibres, or the ſtrength of the bone, is proportional to its ſemi-diameter, and conſequently to its diameter.

I have here taken for an example one of the moſt ſimple caſes for calculating the proportional forces of bones. But, was it not too foreign to the preſent deſign, it might be univerſally demonſtrated, that, of whatever figure bones are, and in whatever manner their fibres are diſpoſed, their ſtrength muſt always be in a ratio, compounded of the area of their tranſverſe ſections, or of their quantity of bony matter, and of the diſtance of the centre of gravity of theſe ſections from the centre of motion or fulcrum, on which the bone is ſuppoſed to be broken.*

Since therefore the ſtrength of bones depends on their number of fibres, or quantity of matter, and the largeneſs of their diameters, one may conclude, that the part of a bone formerly fractured, and re-united by a callus, muſt be ſtronger than it was before the fracture happened; becauſe both theſe advantages are obtained by a callus; which is a wiſe proviſion, ſince bones are never ſet in ſuch a good direction as they were naturally of; and then, wherever a callus is formed, there is ſuch an obſtruction of the veſſels, that if the bone was again broken in the ſame place, the oſſific matter could not ſo eaſily be conveyed to re-unite it. This callus may indeed, for want of compreſſion, be allowed to form into a ſpongy cellular ſubſtance;† but even in this caſe the ſtrength of the bone is here increaſed by one or both the cauſes above-mentioned.

Many bones have protuberances, or proceſſes,* riſing out from them. If a proceſs ſtands out in a roundiſh ball, it is called *caput*, or head.—If the head is flatted, it obtains the appellation of *condyle*.—A rough unequal protuberance is called *tuberoſity*.—When a proceſs riſes narrow, and then becomes large, the narrow or ſmall part is named *cervix*, or neck.—Long ridges of bones are called ſpines.—Such proceſſes as terminate in a ſharp point have the general name of *coronæ*,† or coronoid, beſtowed on them, though moſt of them receive particular names from the reſemblance they have, or are imagined to have, to other ſubſtances, *e. g.* maſtoid, ſtyloid, anchoroid, coracoid, ſpinal, &c.—Such proceſſes as form brims of cavities are called *ſupercilia*.‖

Proceſſes ſerve for the advantageous origin and inſertion of muſcles, and render the articulations firm and ſtable.

Before leaving this ſubject, we muſt remark, that much the greater number of what are called proceſſes in adult bones, diſcover themſelves in children to be epiphyſes, or diſtinct bones, which are afterwards united to the other parts; ſuch are the ſtyloid proceſſes of the temporal bones, proceſſes of the vertebræ, trochanters of the thigh, &c. However, as I deſign to inſiſt chiefly on the deſcription of the adult ſkeleton, in which the union of theſe parts is ſo intimate, that ſcarce any veſtige remains of their former ſeparation, I ſhall retain the common appellation of *apophyſe*, or proceſs, to all ſuch protuberances; but ſhall remark the principal ones, that have no juſt title to this name, when they occur in the deſcription of particular bones.

* See the demonſtration of this theorem by Dr. Porterfield in the Edinburgh Medical eſſays, vol. 1. art. 10.

† Ruyſch. Theſaur. 8. n. 49. Muſ. anat. thec. B. repoſit. 2. n. 2.

* Ἀπόφυσεις, ἔκφυσεις, ἐξοχὴ, προβολὴ, πρόξλημα, Exceſſus, explanatio, tuberculum, gibbus, eminentia, productio, extuberantia, projectura, enaſcentia.

† Roſtra, glandes.

‖ Ὀφρυς, ὄφρυες, ἀμφόδονες, χείλη, Labra.

On the ſurfaces of a great many of the bones there are cavities, or depreſſions. If theſe are deep, with large brims, authors name them *cotylæ*,*—If they are ſuperficial, they obtain the deſignation of *glenæ*, or glenoid. Theſe general claſſes are again divided into ſeveral ſpecies;—of which *pits* are ſmall roundiſh channels ſunk perpendicularly into the bone;—*furrows* are long narrow canals, formed in the ſurface;——*niches*, or notches, ſmall breaches in the bone;—*ſinuoſities*, broad but ſuperficial depreſſions without brims;—*foſſæ*, large deep cavities, which are not equally ſurrounded by high brims;—*ſinuſes*, large cavities within the ſubſtance of the bones, with ſmall apertures;—*foramina*, or holes, canals that pierce quite through the ſubſtance of the bones.—When this laſt ſort of cavity is extended any long way within a bone, the middle part retains the name of *canal*, and its ends are called *holes*.

The cavities allow the heads of bones to play in them; they lodge and defend other parts; they afford ſafe paſſage to veſſels, muſcles, &c. To mention more would engage us too much in the hiſtory of particular bones, which more properly belongs to the demonſtration of the ſkeleton, where we ſhall have occaſion to obſerve theſe ſeveral ſpecies of cavities.

To far the greater number of bones, whoſe ends are not joined to other bones by an immoveable articulation, there are ſmaller ones annexed, which afterwards become ſcarce diſtinguiſhable from the ſubſtance of the bone itſelf. Theſe are called *epiphyſes*, or *appendices*.† Some bones have one, others have two, three, or four of theſe appendices annexed by the means of cartilages, which are of a conſiderable thickneſs in children, but by age become thinner; the oſſification proceeding from the end of the bone on one ſide, and from the epiphyſes on the other, till at laſt, in adults, the place of their conjunction can ſcarcely be ſeen on the external ſurface; and it is only ſometimes that we can then ſee any mark of diſtinction in the cancelli.*

Several proceſſes (*e. g.* trochanters of the thigh, ſpine of the ſcapula, &c.) have epiphyſes; and proceſſes frequently riſe out from epiphyſes; for example, at the lower end of the femur, ulna, tibia, &c.†

The epiphyſes are united chiefly to ſuch bones as are deſtined for frequent and violent motion; and for this purpoſe they are wiſely framed of a larger diameter than the bone they belong to; for by this means, the ſurface of contact between the two bones of any articulation being increaſed, their conjunction becomes firmer, and the muſcles inſerted into them act with greater force, by reaſon of their axes being farther removed from the centre of motion. Theſe advantages might have been obtained by the expanſion of the end of the bone itſelf, to a thickneſs equal to that of the epiphyſes; but then the conſtant ſeparation of new plates to form ſo wide a cellular ſtructure, muſt have left the ſolid ſides of the bones ſo thin, as to yield eaſily, either to the action of the muſcles fixed to them, and paſſing over them to the weight ſeveral of them are obliged to ſupport, or to the application of any other external force.

Several anatomiſts‡ thought that the epiphyſes ſerve other purpoſes: ſuch as ſecuring the ligaments of the articulations which riſe out from between the bones and them; for as ſoon as theſe parts are intimately joined, the ligaments inſinuated between them muſt have a much ſtronger connection than they could have to the ſmooth ſurface of the bones. Such

* Κοτυλίδες, ὀξυβάφοι, Acetabula, pixides buccelæ.

† Applantatio, additamentum, adnaſcentia, adnexum, perone.

* Winſlow, Expoſition anatomique de corps humain, traite des os ſecs, ſect. 116.

† Veſal. De human. corp. fabrica, lib. 1. cap. 3.

‡ Collumb. De re anatomica. lib. 1. cap. 2. Fallop. Expoſ. de oſſibus, cap. 11.

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an interception of the ligament between the body of the bone and its epiphyses is not to be seen; but as, at this place, the bone remains longer soft than any where else, and the adhesion of the periosteum, and of ligaments to bones, is always stronger in proportion to the bones being nearest to the consistence of those parts, which is, being softest, the opinion of these writers concerning the stronger connection of the ligaments, where the bones and epiphyses join, is not without some foundation.

Possibly too, by the fibres of epiphyses not extending themselves so longitudinally as those of the bones, there may be less chance of the former running into each other, than of the latter.

The softness of the ends of the bones may be of some advantage in the womb, and at birth, after which the ossification begins at different points to form epiphyses, before the ossification can extend from the middle to the ends of the bones.*

However solid and compact adult bones are, yet they were once cartilages, membranes, nay, a mere gelly. This needs no farther proof, than repeated observations of embryos when dissected. And how much more tender must the bones be before that time, when neither knife nor eye is capable to discover the least rudiments of them? By degrees they become more solid, then assume the nature of gristles, and at last ossify; the cohesion of their plates and fibres always increasing in proportion to their increased solidities; as is evident from the time necessary to unravel the texture of bones of people of different ages, or of dense and of spongy bones, or of the different parts of the same bone, and from the more tedious exfoliations of the bones of adults than of children.

After any part of the bone is fully ossified, its fibres are extended little more in length at that part, though they increase there in thickness, and though their softer parts continue to become longer.*

As the solidity of bones increases, their periosteum more easily separates from them. When bones are membranous, the periosteum and they cannot be distinguished; they appear to be the same substance. When they are cartilages, their membranes adhere so firmly to them, that it is difficult to separate it from them. Where the rigid bony fibres are, the periosteum is easily taken off. Is the similarity of structure and consequent greater attraction of the membrane and substance it incloses, while they are both flexible, the cause of their greater adhesion? or is it owing to the vessels that go from the one to the other being larger? or do both these causes combine to produce this effect? or is the membrane or cartilage, which becomes bone afterwards, to be considered as the same substance with the periosteum?† and must all these plates of bones be therefore said to be layers of the periosteum hardened.‡

The ossification of bones depends principally on their vessels being so disposed, and of such diameters, as to separate a liquor, which may easily turn into a bony substance, when it is deprived of its thinner parts; as seems plain from the observation of the callous matter separated after fractures and ulcers, where part of the bone is taken out; for in these cases, the vessels extending themselves, and the liquors added to them are gradually formed into granulated flesh; which fills up all the space where the bone is taken from, then hardens, till it becomes as firm as any other part of the bone. This happens frequently, even when the ends of the diseased bone are at a considerable distance from each other.‖

* Haller de studio medic. p. 267.

* Hale's Vegitable statics. p. 293, Du Hamel Memoires de l'Acad. des sciences, 1742.

† Memoires de l'Acad. des sciences, 1744.

‡ Memoires de l'Acad. des sciences, 1743.

‖ Hildan. de vuln. gravis. Med. essays, vol. 1. art. 23. Job a Meckren obs. 69. Mem. de l'Acad. des sciences, 1742. See a Collection of such cases in Bochmer de ossium callo.

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The induration of bones is alſo greatly aſſiſted by their being expoſed, more than any other parts, to the ſtrong preſſure of the great weights they ſupport, to the violent contraction of the muſcles fixed to them, and to the force of the parts they contain, which endeavour to make way for their farther growth. By all this preſſing force, the ſolid fibres and veſſels of bones are thruſt cloſer; and ſuch particles of the fluids conveyed in theſe veſſels as are fit to be united to the fibres, are ſooner and more firmly incorporated with them, while the remaining fluids are forcibly driven out by the veins, to be mixed with the maſs of blood. In conſequence of this, the veſſels gradually diminiſh as the bones harden. From which again we can underſtand one reaſon, why the bones of young animals ſooner re-unite after a fracture than thoſe of old, and why cattle that are put too ſoon to hard labour ſeldom are of ſuch large ſize as others of the ſame brood who are longer kept from labour.

That the oſſifying of bones greatl depends on preſſure ſeems to be evinced from the frequent examples we meet with of other parts turning bony, when long expoſed to the preſſing force of the ſurrounding parts, or when they are ſubjected to the like circumſtances by their own frequent and violent contraction. Witneſs the bones found frequently near the baſe of the heart in ſome old men,* and in ſeveral other creatures. Nay, the muſcular ſubſtance of the heart has been oſſified in ſuch,† and the arteries of old men often become bony. The cartilages of the larynx are generally oſſified in adults. In beaſts of burden, the cartilages between the vertebræ of the back very often change into complete bones; and, being intimately united with the vertebræ, the whole appears one continued bone: nor is the perioſteum exempted from ſuch an induration.*

To confirm this argument ſtill farther, we may obſerve, that bones begin their oſſification at the places where they are moſt expoſed to theſe cauſes, viz. in the cylindrical bones from a middle ring, and in the broad ones, at or near their centre, from one or more diſtinct points. The reaſon of which is, that theſe parts are contiguous to the bellies of the muſcles annexed to the bones, where the ſwelling of theſe moving powers is greateſt. What the effects of this may be, let any judge, who view ſome of the bones, as the ſcapula and oſſa ilium, which are covered with muſcles on each ſide, how compact and thin they are in adults, where the bellies of the muſcles were lodged; whereas in children they are thicker. But this being the middle part of theſe bones, where the greateſt number of fibres is, this particular place would have been much thicker in adults, had not this forcible cauſe been applied, which has not had ſuch effects in children, whoſe muſcles have not been much exerciſed. Beſides, if we allow that all the parts of a bone are equally increaſed by the conſtant ſupply of new particle, each fibre, and every particle of a fibre, endeavours to make way for its own growth, by puſhing the one next to it; and conſequently by far the greateſt preſſure is on the middle to make the particles firm, and therefore to begin their oſſification there. Laſtly, the pulſation of the medullary arteries, which enter the bones near to this middle part, may, as authors have alledged, contribute perhaps ſomewhat to this induration.

From the effects of preſſure only it is, that we can account for the bones of old people having their ſides much thinner, yet more denſe and ſolid, while the cavities are much larger than in thoſe of young people; and for the prints of muſcles, veſſels, &c. being more ſtrongly marked on the

* Riolan. Comment. de oſſib. 32. Bartholin. Hiſt. medic. cent. 1. hiſt. 50. Ibid. cent. 2. hiſt. 45.

† Cheſelden. Anatomy, book 1. introd. Garengeot, Hiſt. de l'acad. des ſciences, 1726.

* Peyer. Ephemerid. German. decur. 2. ann. 7. obſerv. 205.

the surfaces of the former than of the latter, if they belong to people of near the same condition in life. Pressure must likewise be the cause, which, in people of equal ages, makes these prints stronger in the bones of those who had much labour and exercise, than they are in people who have led an indolent inactive life.

Perhaps both the causes of ossification above-mentioned may be assisted by the nature of the climate people live in, and the food they use. Whence, in hot countries, the inhabitants sooner come to their height of stature than in the northerly cold regions: and thence seems to have arisen the common practice among the ladies, of making puppies drink brandy, or spirit of wine, and of bathing them in these liquors, to prevent their growing big. Nay, it has been observed, that much use of such spirits has occasioned parts, naturally soft, to petrify in some, and to ossify in other people of no great age.*

From the foregoing account of the structure of bones, and of their ossification, we may understand the reasons of the following phænomena:—

How the natural colour of bones may be changed by some sorts of food.†

Why the bones of some people are so long in hardening, and in others never completely indurate.

Why, in such whose ossification is slow, the bones are generally thicker in proportion to their lengths, especially at their ends; as in the rickets.

How hard firm bones have become soft and pliable by diseases.‡

Why in some diseases, epiphyses separate from bones,* and the ends of fractured bones come asunder many years after their fractures appeared to be cured.†

How bones may waste and diminish.‡

How bones may become solid all through, without any appearance of cancelli.‖

How nodes, tophi, and exostoses, happen after the erosion of the external plates of bones in the lues venerea, scurvy, rheumatism, and gout.

How bones exfoliate by the rising of granulated flesh from their surface.

How and from what, callus is formed after a fracture.§

Why callus appears to be rather the continued substance of the periosteum than of the bone, while it remains soft and flexible; but seems continued with the bone after it ossifies.**

Why callus is sensible, while it is soft, but becomes insensible when it hardens.

What occasions sometimes such difficulty in curing fractured bones; or why they never re-unite, though they are reduced, and all proper means towards a cure are used.††—Are the bones of women with child more tedious in re-uniting than those of other people?‡‡

Why calluses, after fractures, are sometimes very thick and protuberant.

What difference there ought to be in the application of bandages to fractures of the bones of old and of young patients.

* Littre, Histoire de l'acad. des sciences, 1706. Geoffroy, Memoires de l'acad. des sciences, 1706.

† Philosoph. Transact. 442. art. 8. num. 443. art. 2. num. 457. art. 4. Mem. de l'acad. des sciences, 1739. 1742.

‡ Histoire de l'acad. des sciences, 1700. Mem. 1722. Gagliardi Anatom. ossium. cap. 2. observ. 3. Ephem. Germ. decur. 1. ann. 1. obs. 37. et schol. decur. 2. ann. 7. obs. 212. 235. decur. 3. ann. 2. obs. 3. Philos. Trans. No. 470. sect. 3. Ibid. vol. 48. sect. 4. and 44.

* Memoires de l'acad. des sciences, 1699. Dienerbroek, Anat. lib. 9. cap. 19. Cowper's Anat. explic. tab. 96. fig. 1.

† Anson's Voyage.

‡ Cheselden. Anat. book 1. introd. Hist. de l'acad. des sciences, 1700.

‖ Ruysch. Thesaur. 2. arc. 5. thes. 3. loc. 1. numb. 5. thes. 9. numb. 2. not. 3. Bochmer de callo ossium.

§ Memoires de l'acad. des sciences, 1741. Debtleef de ossium callo.

** Mem. de l'acad. 1741.

†† Meckren Observ. medico-chirurg. obs. 71. Ruysch. Adverf. dec. 2. sect. 2. observ. anat. chir. obs. 4. Van Swieten in Boerhaave Aphor. sect. 354.

‡‡ Hildan. centur. 5. obs. 87. et cent. 6. obs. 68. Philos. Transact. No. 494. sect. 21.

How bones, remaining long unreduced after a luxation, may have their form so changed as to make their reduction very difficult, if not impossible.*

Whoever is desirous to know in what time and order each bone and its several parts begin to assume a bony nature, let him consult Kerkringius,† who gives us the delineations of abortions from three days after conception, and traces the ossification of the bones from three weeks, and a month, till the time of the birth: To whom should be added Coiterus,‡ and Eyssonius.‖ An account of this subject might also be collected out of Ruysch's works, where some of the mistakes committed by the former authors are corrected; and several more particulars, to make the history of the osteogenea more accurate, have since been added by Nesbit§ and Albinus.**

I must refer to the authors now quoted for the more curious part of the human osteogeny; not having preparations enough to give such a full history of it as is done by them. But I shall endeavour to explain the more useful and necessary part of the osteogeny, by subjoining to the description of each bone of an adult, its condition in ripe children; that is, in such as are born at the ordinary time; and shall point out what parts of each are afterwards joined in form of epiphyses. This, with the following general rules, seem to me sufficient for understanding what of this subject is necessary in the practice of physic and surgery.

1. Wherever I mention any parts being cartilaginous, or their being still separable from the other parts of the bone to which they belong, I would be understood to hint, that about seven or eight years of age, such parts are ossified and united to their proper bones, unless when it is said that they are afterwards formed into epiphyses.

2. Such as become epiphyses, are generally ossified at seven or eight years of age; but, being for the most part moistened by synovia, their external surface is still somewhat cartilaginous, and they are not yet united to their bones.

3. At eighteen or twenty years of age the epiphyses are entirely ossified, and have blended their fibres so with the body of the bone, as to make them inseparable without violence.

The knowledge of this part of the osteogeny I think necessary, to prevent dangerous mistakes in the cure of several diseases. As for example:—Without this knowledge, the separation of an epiphyse might be mistaken for a fracture, or luxation. The interstice of two parts of a bone not yet joined, might be judged to be a fissure. A diastasis, or separation of such disjointed pieces of a bone, might be thought a fracture. The protrusion of one piece, or its over-lopping any other, could be mistaken for an excrescence or exostosis. Such errors about the nature of a disease would give one very different indications of cure, from what he would have, if he really understood his patient's ease. And very often the knowledge of the different inequalities on the surfaces of bones, must direct us in the execution of what is proper to be done to cure several of their diseases.

Having thus considered the bones when single, we ought next to shew the different manner of their conjunctions.* To express these, anatomists have contrived a great number of technical terms; about the meaning, propriety, and classing of which, there has unluckily been variety of opinions. Some of these terms it is necessary to retain,

* Saltzman. Obs. decur. obs. 6. Memoires de l'acad. de chirurgie. tom. 2. p. 155. Boehmer Instit. osteolog. sect. 596.

† Anthropograph. ichnograph. et osteogenea fœtuum.

‡ De ossibus fœtus abortivi.

‖ De ossibus infant. cognoscend. et curand.

§ Human Osteogeny explained.

** Icones ossium fœtus humani; accedit osteogeneæ. brevis historia.

* σύνταξις, σύνθεσις, συμβολὴ, ὁμιλία. compositio, connexio, articulatio, conjunctio, nodus, commissura, structura, compages.

retain, since they serve to express the various circumstances of the articulations, and to understand the writers on this subject.

The ARTICULATIONS are most commonly divided into three classes, viz. *symphysis*, *synarthrosis*, and *diarthrosis*.

Symphysis, which properly signifies the concretion or growing together of parts, when used to express the articulations of bones, does not seem to comprehend, under the meaning generally given to it, any thing relating to the form or motion of the conjoined bones; but by it most authors only denote the bones to be connected by some other substance; and as there are different substances which serve this purpose, therefore they divide it into the three following species:

1. *Synchondrosis*,* when a cartilage is the connecting substance. Thus the ribs are joined to the sternum; thus the bodies of the vertebræ are connected to each other; as are likewise the ossa pubis.

2. *Synneurosis*, or *syndesmosis*, when ligaments are the connecting bodies, as they are in all the moveable articulations.

3. *Syssarcosis*, when muscles are stretched from one bone to another, as they must be where there are moveable joints.

The second class of articulations, the *synarthrosis*, which is said to be the general term by which the immoveable conjunction of bones is expressed, is divided into three kinds.

1. The *suture* † is that articulation where two bones are mutually indented into each other, or as if they were sowed together, and is formed by the fibres of two bones meeting while they are yet flexible and yielding, and have not come to their full extent of growth; so that they mutually force into the interstices of each other, till, meeting with such resistance as they are not able to overcome, they are stopped from sprouting out farther, or are reflected; and therefore these indentations are very different both in figure and magnitude: thus the bones of the head are joined; thus epiphyses are joined to the bones, before their full connection and union with them.

Under this title of *suture*, the *harmonia* of the antients may be comprehended; scarce any unmoved bones being joined by plain surfaces.*

2. *Gomphosis* † is the fixing one bone into another, as a nail is fixed in a board; thus the teeth are secured in their sockets.

3. *Shindylesis*, or *ploughing*,‡ when a thin lamella of one bone is received into a long narrow furrow of another. Thus the processus azygos of the sphenoid, and the nasal process of the ethmoid bone, are received by the vomer.

The third class, or *diarthrosis* ‖ is the articulation where the bones are so loosely connected as to allow large motion. This is subdivided into three kinds.

The first is *enarthrosis*, or the ball and socket, when a large head is received into a deep cavity; as the head of the os femoris is into the acetabulum coxendicis.

The second is *arthrodia*, when a round head is received into a superficial cavity; as in the articulation of the arm-bone and scapula. These two species of diarthrosis allow motion to all sides.

The third is *ginglimus*,§ which properly signifies the hinge of a door or window; in it the parts of the bones mutually receive and are received, and allow of motion two ways. Workmen call it *charnal*.

The ginglimus is generally divided into three kinds, to which some ** give

* Amphiarthrosis

† Ῥάφη.

* Vessal. Observ. Fallop. Examen.

† Conclavatio.

‡ Keil. Anat. chap. 5. sect. 13.

‖ Διαρθρώσις, de articulatio, ab articulatio.

§ Articulatio mutua.

** Baker, Curs. osteolog. demonstr. 1.

give the names of *contiguous*,* *distant*,† and *compound*.‡

The first kind of ginglimus is, when a bone has several protuberances and cavities, which answer to as many cavities and processes of the other bone, with which it is articulated, as in the conjunction of the femur with the tibia.

The second species is, when a bone receives another at one end, and is received by the same bone at the other end; as in the radius and ulna.

The last sort is, when a bone receives another, and is received by a third; as in the oblique processes of the vertebræ.

When I first mentioned the articulations of bones, I said there were different opinions concerning the use of their technical names, *e. g.* it has been said, that *symphysis* should be the name for the immoveable articulations, and *synarthrosis* should be understood to be the conjunction of bones by some connecting medium. Those who have taken symphysis in the sense I did, of its expressing the conjunction of bones with a connecting substance, have disagreed in their definition of it; some inserting, and others leaving out, its allowing motion. Where they have agreed in their definition, they have not been of the same mind concerning the species of it; for several think the sysarcosis and syndesmosis applicable to so many joints which are universally allowed to be classed under the diarthrosis, that it must create confusion to name them by any species of the symphysis. Few keep to such a general definition of the synchondrosis as I have done; and, whether they determine it to allow no motion, or an obscure or a manifest one, bring themselves into difficulties, because there are examples of all these three kinds. Some again, by too nicely distinguishing obscure and manifest motions of bones, have blended the synarthrosis and diarthrosis, and from thence have branched out the different compound species of articulations that may be formed of them so far, that they could find no examples in the body to illustrate them by. It would be tedious to enumerate more of the jarring opinions, and it would be far more so to give a detail of the arguments used by the disputants. It is sufficient for my purpose, that it is understood in what sense I take these technical terms, which I do in the following manner:

When I mention the symphysis or synarthrosis, or any species of them, I shall always understand them according to the explication already given of them. But though the preceding account of the diarthrosis, or articulation of moveable bones has been almost universally received; yet, seeing it does not comprehend all the moveable articulations of the body, and one of its species does not answer to any notion we can have of the conjunction of two bones, I must beg leave to change the definitions and kinds of these joints.

I would call *diarthrosis* that conjunction of bones, whereby they are fitted for motion, being each covered with a smooth cartilage, connected by one or more common ligaments, and lubricated with liquor at the conjoined parts. In which definition, I have no regard to the quantity of motion which they really do perform; the motion being often confined or enlarged by some other cause not immediately depending on the frame of the two surfaces of the bones forming the particular joint which then is considered.

The first species of the diarthrosis, viz. the enarthrosis, or ball and socket, I would define more generally than above, that articulation where a round head of one bone is received into a cavity of another, and consequently, without some foreign impediment, is capable of motion to all sides. Examples of this kind are to be seen in the articulation of the thigh-bone and ossa innominata; arm-bone and scapula;

* Proximus.
† Longus.
‡ Compositus.

ſcapula; aſtragalus and os naviculare; magnum of the wriſt, with the ſcaphoides and lunare; firſt bone of the thumb with the ſecond, &c.

The ſecond ſort, or the arthrodia, differing from the enarthroſis, in the preceding account, only in the cavity being more ſuperficial, which makes no eſſential difference, eſpecially that, in the recent ſubject, cartilages or ligaments ſupply the deficiency of bone, ought, in my opinion, to be called, with Veſalius,* that articulation of two bones adapted for motion, where it is not at firſt ſight obvious which of the two has the head or cavity, or where they are joined by plain ſurfaces, or nearly ſo; ſuch is the conjunction of the clavicle with the ſcapula; oſſa cuneiformia with the os naviculare; metatarſal bones with the oſſa cuneiformia, &c. From the nature of this ſort of joint, it is plain, that very great motion cannot be allowed, without the bones going farther out of their natural ſituation than is convenient or ſafe.

"*Ginglimus* I would reckon that articulation, by the form of which the motion of the joined bones muſt be chiefly confined to two directions, which hinges of doors are.

The firſt ſpecies of this is the trochoides, when one bone turns on another, as a wheel does on its axis: Thus the firſt vertebra of the neck moves on the tooth-like proceſs of the ſecond. This is the moſt proper kind of ginglimus.

The ſecond ſpecies ſhould be eſteemed that articulation where ſeveral prominent and hollow ſurfaces of two bones move on each other, within the ſame common ligament; as in the knee, elbow, &c.

The third ſort of ginglimus is, when two bones are articulated to each other at different parts, with a diſtinct apparatus of the motory machines at each; ſuch is the articulation of the os occipitis with the firſt vertebra of the neck; of any two contiguous vertebræ, by their oblique proceſſes; of the ribs with the bodies and tranſverſe proceſſes of the vertebræ; of the radius with the ulna, tibia with the fibula, aſtragalus with the calcaneum, &c.

I would entirely throw out what is commonly called the third kind of ginglimus; for, in examining the conjunction of a bone with two others, as in the common example of a vertebra joined with the one above and below, the connection of the middle one with each of the other two ought to be conſidered ſeparately; otherwiſe we might with the ſame propriety eſteem the articulations that the long bones, the femur, tibia, humerus, &c. have at their different ends, as one articulation; which is abſurd.

If the moveable bones are not connected and kept firm by ſome ſtrong ſubſtance, they would be luxated at every motion of the joints; and if their hard rough unequal ſurfaces were to play on each other, their motion would not only be difficult, but the loſs of ſubſtance from attrition would be great. Therefore ligaments are made to obviate the firſt, and cartilages to prevent the other inconvenience. But becauſe ligaments and cartilages turn rigid, inflexible, and rough, unleſs they are kept moiſt, a ſufficient quantity of proper liquors is ſupplied for their lubrication, and to preſerve them in a flexible ſtate.

Seeing theſe parts are ſo neceſſary to the articulations, I ſhall next conſider their ſtructure, ſituation, and uſes, ſo far as they are ſubſervient to the bones, and their motions.

LIGAMENTS* are white flexible bodies, thicker and firmer than membranes, and not ſo hard or firm as cartilages, without any remarkable cavity in their ſubſtance, difficultly ſtretched, and with little elaſticity; ſerving to connect one part to another, or to prevent the parts to which they are fixed from being removed out of that ſituation which is uſeful and ſafe.

After maceration in water, the li-

* De corp. human. fabrica. lib. 1. cap. 4.

* Συνδεσμοι, νευροι, copulæ, vincula.

gaments

gaments can eafily be divided; and each ligamentous layer appears compofed of fibres, the largeft of which are difpofed in a longitudinal direction.

The arteries of ligaments are very confpicuous after a tolerable injection, and the larger trunks of their veins are fometimes to be feen full of blood.

Such ligaments as form the fides of cavities, have numerous orifices of their arteries opening upon their internal furface, which keep it always moift. If we rub off that moifture, and then prefs the ligament, we can fee the liquor oufing out from fmall pores; and we can force thin liquors injected by the arteries into the cavities formed by ligaments.

Thefe exhalent arteries muft have correfponding abforbent veins, otherwife the cavities would foon be too full of liquor.

Ligaments then muft be fubject to the difeafes common to other parts, where there is a circulation of fluids, allowance always being made for the fize of veffels, nature of the fluids, and firmnefs of the texture of each part.

Authors generally fay, that ligaments are infenfible; and confequently it may be inferred, that they have no nerves beftowed on them; but the violent racking pain felt on the leaft motion of a joint labouring under a rheumatifm, the feat of which difeafe feems often to be in the ligaments, and the infufferable torture occafioned by incifions of ligaments, and by a collection of acrid matter in a joint, or by tophi in the gout, would perfuade us, that they are abundantly fupplied with nerves.

The ligaments which connect the moveable bones commonly rife from the conjunction of the epiphyfes of the one bone, and are inferted into the fame place of the other; or where epiphyfes are not, they come out from the cervix, and beyond the fupercilia of the articulated bones; and after fuch a manner, in both cafes, as to include the articulation in a purfe or bag, with this difference, depending on their different motions, that where the motion is only to be in two directions, the ligaments are ftrongeft on thofe fides towards which the bones are not moved; and when a great variety of motions is defigned to be allowed, the ligaments are weaker than in the former fort of articulations, and are nearly of the fame ftrength all round.

Part of the capfular ligaments is compofed of the periofteum, continued from one bone to another, as was obferved p. 7, and their internal layer is continued on the parts of the bone or cartilage which the ligament includes.*

Befides thefe common capfular ligaments of the joints, there are particular ones in feveral places, either for the firmer connection of the articulated bones, or for reftraining and confining the motion to fome one fide; fuch are the crofs and lateral ligaments of the knee, the round one of the thigh, &c.

From this account of the ligaments, we may conclude, that, *cæteris paribus*, in whatever articulation the ligaments are few, long, and weak, the motion is more free and quick; but luxations happen frequently: and, on the contrary, where the ligaments are numerous, fhort, and ftrong, the motion is more confined; but fuch a joint is lefs expofed to luxations.†—Whence we may judge how neceffary it is to attend to the different ligaments, and the changes which have been made on them by a luxation, when it is to be reduced.

Ligaments alfo fupply the place of bones in feveral cafes to advantage. Thus the parts in the pelvis are more fafely fupported below by ligaments than they could have been by bone. The ligaments placed in the great holes of the offa innominata, and between the bones of the fore-arm and leg,

* Nefbit, Ofteogen. Philof. Tranfact. No. 470. fect. 6.

† Fabric. ab Aquapend. de articul. part. utilit. pars 3.

leg, afford convenient origin to muſcles. Immoveable bones are firmly connected by them; of which the conjunction of the os ſacrum and innominatum is an example. They afford a ſocket for moveable bones to play in, as we ſee part of the aſtragalus does on the ligament ſtretched from the heel-bone to the ſcaphoid.

Numerous inconveniences may ariſe from too long or ſhort, ſtrong or weak, lax or rigid ligaments.

CARTILAGES * are ſolid, ſmooth, white, elaſtic ſubſtances, between the hardneſs of bones and ligaments, and covered with a membrane, named *perichondrium*, which is of the ſame ſtructure and uſe to them as the perioſteum is to the bones.

Cartilages are compoſed of plates, which are formed of fibres, diſpoſed much in the ſame way as thoſe of bones are; as might be reaſonably concluded from obſerving bones in a cartilaginous ſtate before they oſſify, and from ſeeing, on the other hand, ſo many cartilages become bony. This may be ſtill farther confirmed, by the exfoliation which cartilages are ſubject to, as well as bones.

The perichondrium of ſeveral cartilages, for example, thoſe of the ribs and larynx, has arteries which can be equally well injected with thoſe of the perioſteum; but the veſſels of that membrane in other parts, *e. g.* the articular cartilages, are ſmaller, and in none of them does injection enter deep into the ſubſtance of the cartilages; nay, madder, mixed with the food of animals, does not change the colour of cartilages, as it does that of bones.†

The granulated fleſh which riſes from the ends of metacarpal or metatarſal bones, when the cartilage exfoliates, after a finger or toe has been taken off at the firſt joint, is very ſenſible, from which the exiſtence of nerves in cartilages may be inferred.

* Χονδροι.

† Philoſ. Tranſact. No. 442. art. 8. No. 443. art. 2. No. 457. art. 4. Mem. de l'acad. des ſciences 1739 et 1742. Dehlleet de oſſium callo.

While cartilages are in a natural ſtate, it is to be remarked, firſt, that they have no cavity in their middle for marrow; ſecondly, that their outer ſurface is ſofteſt, which renders them more flexible; thirdly, that they do not appear to change their texture near ſo much by acids as bones do; and, laſtly, that as the ſpecific gravity of cartilages is near a third leſs than that of bones, ſo the coheſion of their ſeveral plates is not ſo ſtrong as in bones: whence cartilages laid bare in wounds or ulcers, are not only more liable to corrupt, but exfoliate much ſooner than bones do.

Cartilages ſeem to be principally kept from oſſifying, either by being ſubjected to alternate motions of flection and extenſion, the effects of which are very different from any kind of ſimple preſſure, or by being conſtantly moiſtened.* Thus the cartilages on the articulated ends of the great bones of the limbs, and the moveable ones placed between the moving bones in ſome articulations, which are obliged to ſuffer many and different flections, and are plentifully moiſtened, ſcarce ever change into bone; while thoſe of the ribs, and larynx, are often oſſified. The middle angular part of the cartilages of the ribs, which is conſtantly in an alternate ſtate of flection and extenſion, by being moved in reſpiration, is always the laſt of becoming bony. In the larynx, the epiglottis, which is oftener bended and more moiſtened than the other four cartilages, ſeldom is oſſified, while the others as ſeldom eſcape it in adults.

The cartilages ſubſervient to bones, are ſometimes found on the ends of bones which are joined to no other; but are never wanting on the ends, and in the cavities of ſuch bones as are deſigned for motion.† Cartilages alſo are interpoſed between ſuch other cartilages as cover the heads and cavities of articulated bones; nay, they are alſo placed between immoveable bones.

* Havers Oſteolog. nov.

† Celſ. de re medic. lib. 8. cap. 1.

The

The uſes of cartilages, ſo far as they regard bones, are to allow, by their ſmoothneſs, ſuch bones as are deſigned for motion, to ſlide eaſily without detrition, while, by their flexibility, they accommodate themſelves to the ſeveral figures neceſſary in different motions, and, by their elaſticity, they recover their natural poſition and ſhape as ſoon as the preſſure is removed. This ſpringy force may alſo aſſiſt the motion of the joint to be more expeditious, and may render ſkocks in running, jumping, &c. leſs. To theſe cartilages we chiefly owe the ſecurity of the moveable articulations, for without them the bony fibres would ſprout out, and intimately coaleſce with the adjoining bone; whence a true anchyloſis muſt neceſſarily follow, which never fails to happen when the cartilages are eroded by acrid matter, or oſſified from want of motion or defect of liquor, as we ſee often happens after wounds of the joints, paidarthrocace, ſcrophula, and ſpina ventoſa, or from old age, and long immobility of joints.* Hence we may know what the annihilation is which is ſaid to be made of the head of a bone, and of the cavity for lodging it, after an unreduced fracture.† The moveable cartilages interpoſed in joints ſerve to make the motions both freer and more ſafe than they would otherwiſe be. Thoſe placed on the ends of bones that are not articulated, as on the ſpine of the os illium, baſe of the ſcapula, &c. ſerve to prevent the bony fibres from growing out too far. Cartilages ſometimes ſerve as ligaments, either to faſten together bones that are immoveably joined, ſuch are the cartilages between the os ſacrum and oſſa illium, the oſſa pubis, &c. or to connect bones that enjoy motion, as thoſe do which are placed between the bodies of the true vertebræ, &c. Cartilages very often do the office of bones to greater advantage than theſe laſt could, as in the cartilages of the ribs, thoſe which ſupply brims to cavities, &c.

Too great thickneſs or thinneſs, length or ſhortneſs, hardneſs or ſuppleneſs, of cartilages, may therefore cauſe great diſorders in the body.

The liquor which principally ſerves to moiſten the ligaments and cartilages of the articulations, is ſupplied by glands, which are commonly ſituated in the joint, after ſuch a manner as to be gently preſſed, but not deſtroyed by its motion. By this means, when there is the greateſt neceſſity for this liquor, that is, when the moſt frequent motions are performed, the greateſt quantity of it muſt be ſeparated. Theſe glands are ſoft and pappy, but not friable. In ſome of the large joints they are of the conglomorate kind, or a great number of ſmall glandules are wrapped up in one common membrane. Their excretory ducts are long, and hang looſe, like ſo many fringes, within the articulation; which, by its motion and preſſure, prevents obſtructions in the body of the gland or its excretorics, and promotes the return of this liquor, when fit to be taken up by the abſorbent veſſels, which muſt be in the joints, as well as in the other cavities of the body; and, at the ſame time, the preſſure on the excretory ducts hinders a ſuperfluous unneceſſary ſecretion, while the fimbriated diſpoſition of theſe excretories does not allow any of the ſecreted liquor to be puſhed back again by theſe canals towards the glands.*

Very often theſe fountains of ſlimy liquor appear only as a net-work of veſſels. Frequently they are almoſt concealed by cellular membranes, containing the fat; and ſometimes ſmall ſimple mucous folliculi may be ſeen.†

The different joints have theſe or-

* Columb. de re anat. lib. 15. Deſlandes Hiſt. de l'acad. des ſciences, 1716. Phil. Tranſact. No. 215. Ibid. No. 461. ſect. 16.

† Hildam. de ichor. et mucor. acri Celſi, cap. 5. Ruyſch. Theſ. 8. No. 103. Saltzman in act Petropolit. Tom. 3. p. 275.

* Cowper, Anatom. explicat. tab. 79. lit. E. E.

† Morgagn. Adverſar. 2. animad. 23.

gans

gans in different numbers and sizes; the conglomerate ones do not vary much, especially as to situation, in the similar joints of different bodies; but the others are more uncertain.

Upon pressing any of these glands with the finger, one can squeeze out of their excretories a mucilaginous liquor, which somewhat resembles the white of an egg, or serum of the blood; but it is manifestly salt to the taste. It does not coagulate by acids, or by heat, as the serum does, but by the latter, turns first thinner, and when evaporated, leaves only a thin salt film.

The quantity of this mucilage, constantly supplied, must be very considerable, since we see what a plentiful troublesome discharge of glary matter follows a wound or ulcer of any joint; of which liquor the mucilage is a considerable part.

The vessels which supply liquors for making the secretion of this mucilage, and the veins which bring back the blood remaining after the secretion, are to be seen without any preparation; and, after a tolerable injection of the arteries, the glands are covered with them.

In a sound state, we are not conscious of any sensibility in those glands; but, in some cases which I have seen, when they inflame and suppurate, the most racking pain is felt in them; a melancholy, though a sure proof that they have nerves.

These mucilaginous glands are commonly lodged in a cellular substance; which is also to be observed in other parts of the bag formed by the ligaments of the articulation; and contains a fatty matter, that must necessarily be attenuated, and forced through the including membranes into the cavity of the joint, by the pressure which it suffers from the moving bones.

If then the oil is conveyed from this cellular substance; and if the attenuated marrow passes from the cancelli of the bones by the large pores near their ends, or in their cavities, and sweats through the cartilages there into the articulations (which it may, when assisted by the constant heat and action of the body, more easily do, than when it escapes through the compact substance of the bones in a skeleton) if, I say, this oil is sent to a joint, and is incorporated with the mucilage, and with the fine lymph that is constantly oozing out at the extremities of the small arteries distributed to the ligaments, one of the fittest liniments imaginable must be produced; for the mucus diluted by the lymph contributes greatly to its lubricity, and the oil preserves it from hardening. How well such a mixture serves the purpose it is designed for, Boyle * tells us he experienced in working his air-pump; for the sucker could be moved with much less force after being moistened with water and oil, than when he used either one or other of those liquors; and I believe every one, at first view, will allow the diluted mucilage to be much preferable to simple water.

The *synovia*,† as this liquor, composed of oil, mucilage, and lymph, is commonly now called, while in a sound state, effectually preserves all the parts concerned in the articulations soft and flexible, and makes them slide easily on each other, by which their mutual detrition and over-heating is prevented, in the manner daily practised in coach and cart wheels, by besmearing them with grease and tar.

After the liquor of the articulations becomes too thin and unserviceable, by being constantly pounded and rubbed between the moving bones, it is re-assumed into the mass of blood by the absorbent vessels.

When the synovia is not rubbed betwixt the bones, it inspissates. And sometimes, when the head of a bone has been long out of its cavity, this liquor is said to fill up the place of the bone and hinder its reduction; or

* Physico-mechanic experim.

† Μυξα, mucus, exungia.

if

if a joint continues long unmoved, it is alſo ſaid to cement the bones, and occaſion a true anchyloſis.* If the ſynovia becomes too acrid, it erodes the cartilages and bones; as the lues venerea, ſcurvy, ſcrophula, or ſpina ventoſa. If this liquor is ſeparated in too ſmall quantity, the joint becomes ſtiff; and when with difficulty it is moved, a crackling noiſe is heard, as people advanced in years frequently experience.† If the mucilage and lymph are depoſited in too great quantity, and the abſorbent veſſels do not perform their office ſufficiently, they may occaſion a dropſy of the joints.‡ From this ſame cauſe alſo the ligaments are often ſo much relaxed, as to make the conjunction of the bones very weak; thence ariſe the luxations from an internal cauſe, which are eaſily reduced, but difficultly cured.* Frequently, when ſuch a ſuperfluous quauntity of this liquor is pent up, it becomes very acrid, and occaſions a great train of bad ſymptoms; ſuch as ſwelling and pain of the joints, long ſinuous ulcers and fiſtulæ, rotten bones, immobility of the joints, marcor and atrophia of the whole body, hectic fevers, &c.† From a depravity in the blood or diſeaſes in the organs that furniſh the ſynovia of the joints, it may be greatly changed from its natural ſtate; it may be purulent after inflammation, mucous in the white ſwellings, gelatinous in the rheumatiſm, chalky from the gout, &c.—hence a great variety of diſorders in the joints.‡

* Pare, Chirurgie, livre 15. chap. 18. et livre 16. chap. 5.

† Galen de uſu part. lib. 12. cap. 2. Fabrice ab Aquapend. do articul. part. utilitat. pars 3. Bartholin. Hiſt. medic. cent. 3 hiſt. 11.

‡ Hildan. de ichore et mel iceria acri Celſi.

* Hipocrat. de locis in homine, ſec. 14. et de articul.

† Hildan. de ichore et meliceria acri Celſi.

‡ See Reimer Diſſert. de fungo articulor.

THE ANATOMY OF THE HUMAN BONES.

PART II.

OF THE SKELETON.

THOUGH any dry ſubſtance may be called *ſkeleton*, yet, among anatomiſts, this word is univerſally underſtood to ſignify the bones of animals connected together, after the teguments, muſcles, bowels, glands, nerves, and veſſels, are taken away.*

A ſkeleton is ſaid to be a *natural* one when the bones are kept together by their own ligaments; and it is called *artificial*, when the bones are joined with wire, or any other ſubſtance which is not part of the creature to which they belonged. Small ſubjects, and ſuch whoſe bones are not fully oſſified, are commonly prepared the firſt way; becauſe, were all their parts divided, the niceſt artiſt could not rejoin them, by reaſon of their ſmallneſs, and of the ſeparation of their unoſſified parts; whereas the bones of large adult animals are ſooneſt and moſt conveniently cleaned when ſingle, and are eaſily reſtored to, and kept in, their natural ſituation. Sometimes the ſkeleton of the ſame animal is prepared in both theſe ways; that is, the ſmaller bones are kept together by their natural ligaments, and the larger ones are connected by wires, or ſome ſuch ſubſtances.

Before we proceed to the diviſion and particular deſcription of the ſkeleton, it is worth while to remark, that when the bones are put into their natural ſituation, ſcarce any one of them is placed in a perpendicular bearing to another; though the fabric compoſed of them is ſo contrived, that, in an erect poſture, a perpendicular line, from their common centre of gravity, falls in the middle of their common baſe.

* Cadaveris crates.

base.* On this account, we can support ourselves as firmly as if the axis of all the bones had been a streight line perpendicular to the horizon; and we have much greater quickness, ease, and strength, in several of the most necessary motions we perform. It is true, indeed, that where-ever the bones, on which any part of our body is sustained, decline from a streight line, the force required in the muscles, to counteract the gravity of that part, is greater than otherwise it needed to have been: but then this is effectually provided for in such places by the number and strength of the muscles. So long therefore as we remain in the same posture, a considerable number of muscles must be in a constant state of contraction; which we know, both from reason and experience, must soon create an uneasy sensation. This we call being weary of one posture; an inconvenience that we should not have had in standing erect, if the bearing of all the bones to each other had been perpendicular; but is more than compensated by the advantages above-mentioned.

The human skeleton is generally divided into the head, the trunk, the superior and the inferior extremities.

OF THE HEAD.

BY the *Head* is meant all that spheroidal part which is placed above the first bone of the neck. It therefore comprehends the cranium and bones of the face.

The cranium,† helmet, or brain-case, consists of several pieces, which form a vaulted cavity for lodging and defending the brain and cerebellum, with their membranes, vessels, and nerves.

The cavity of the cranium is proportioned to its contents. Hence such a variety of its size is observed in different subjects; and hence it is neither so broad nor so deep as its fore part, in which the anterior lobes of the brain are lodged, as it is behind, where the large posterior lobes of the brain and the whole cerebellum are contained.

The roundish figure of the skull, which makes it more capacious, and better able to defend its contents from external injuries, is chiefly owing to the equal pressure of these contained parts, as they grow and increase before it is entirely ossified. It is to be observed, however, that the sides of the cranium are depressed below a spherical surface by the strong temporal muscles, whose action hinders here the uniform protrusion of the bones, which is more equally performed in other parts, where no such large muscles are. In children, whose muscles have not acted much, and consequently have not had great effects on the bones; this depression is not so remarkable; and therefore their heads are much rounder than in adults. These natural causes, differently disposed in different people, produce a great variety in the shapes of skulls, which is still increased by the different management of the heads of young children: so that one may know a Turk's skull by its globular figure, a German's by its breadth and flatness of the occiput, Dutch and English by their oblong shapes, &c.* Two advantages are reaped from this flatness of the sides of the cranium, viz. the enlargement of our sphere of vision, and more advantageous situation of our ears, for receiving a greater quantity of sound, and for being less exposed to injuries.

The external surface of the upper part of the cranium is very smooth and equal, being only covered with the periosteum (common to all the bones, but in the skull distinguished by the name of pericranium) the thin frontal and occipital muscles, their tendinous aponeurosis, and with the common teguments of the body; while the external surface of its lower part has

* Cowper Anat. of human bodies, explic. tab. 87. SS.

† Κογχος, κυτος κοιλεια, Σκαφιον, calva, calvaria, cerebri galea, theca et olla capitis, testa capitis, scutella capitis.

* Vesal. lib. 1. c. 5.

has numerous risings, depressions, and holes, which afford convenient origin and insertion to the muscles that are connected to it, and allow safe passage for the vessels and nerves that run through and near it.

The internal surface of the upper part of the skull is commonly smooth, except where the vessels of the dura mater have made furrows in it, while the bones were soft. Surgeons should be cautious when they trepan here, lest, in sawing or raising the bone where such furrows are, they wound these vessels. In the upper part of the internal surface of several skulls, there are likewise pits of different magnitudes and figures, which seem to be formed by some parts of the brain being more luxuriant and prominent than others. Where these pits are, the skull is so much thinner than any where else, that it is often rendered diaphanous, the two tables being closely compacted without a diploe; the want of which is supplied by vessels going from the dura mater into a great many small holes observable in the pits. These vessels are larger, and much more conspicuous than any others that are sent from the dura mater to the skull; as evidently appears from the drops of blood they pour out, when the skull is raised from the dura mater in a recent subject; and therefore they may furnish a sufficient quantity of liquors necessary to prevent the brittleness of this thin part. The knowledge of these pits should teach surgeons to saw cautiously and slowly through the external table of the skull, when they are performing the operation of the trepan; since, in a patient whose cranium has these pits, the dura mater and brain may be injured, before the instrument has pierced near the ordinary thickness of the table of the skull. The internal base of the skull is extremely unequal, for lodging the several parts and appendices of the brain and cerebellum, and allowing passage and defence to the vessels and nerves that go into, or come out from, these parts.

The bones of the cranium are composed of two tables, and intermediate cancelli, commonly called their *diploe*.*

The external table is thickest; the inner, from its thinness and consequent brittleness, has got the name of *vitrea*. Whence we see the reason of those mischievous consequences which so often attend a collection of matter in the diploe, either from an external or an internal cause, before any sign of such a collection appears in the teguments that cover the part of the skull where it is lodged.†

The diploe has much the same texture and uses in the skull, as the cancelli have in other bones.

The diploe of several old subjects is so obliterated, that scarce any vestige of it can be seen; neither is it observable in some of the hard craggy bones at the base of the skull. Hence an useful caution to surgeons who trust to the bleeding, want of resistance, and change of sound, as certain marks in the operation of the trepan, for knowing when their instrument has sawed through the first table, and reached the diploe.‡ In other people, the diploe becomes of a monstrous thickness, while the tables of the skull are thinner than paper.

The cranium consists of eight bones, six of which are said to be proper, and the other two are reckoned common to it and to the face. The six proper are, the *os frontis*, two *ossa parietalia*, two *ossa temporum*, and the *os occipitis*. The common are the *os ethmoides* and *sphenoides*.

The os frontis forms the whole fore part of the vault; the two ossa parietalia form the upper and middle part of it; the ossa temporum compose the lower part of the sides; the os occipitis makes the whole hinder part, and some of the base; the os ethmoides is placed in the fore part of the

* Meditullium commissura.

† Bonet. Sepulcret. anat. lib. 1. sect. 1 obs. 96.--102.

‡ Bartholin. anat. reform. lib. 4. cap. 4.

base

base, and the os sphenoides is in the middle of it. These bones are joined to each other by five sutures; the names of which are, the coronal, lambdoid, sagittal, and two squamous.

The coronal * suture is extended over the head, from within an inch or so of the external canthus of one eye, to the like distance from the other; which being near the place where the ancients wore their vittæ, coronæ, or garlands, this suture has hence got its name. Though the indentations of this suture are conspicuous in its upper part, yet an inch or more of its end on each side has none of them; for it is squamous and smooth there.

The lambdoidal † suture begins some way below, and farther back than the vertex or crown of the head, whence its two legs are stretched obliquely downwards, and to each side in form of the Greek letter Λ, and are now generally said to extend themselves in the base of the skull; but formerly anatomists ‡ reckoned the proper lambdoid suture to terminate at the squamous sutures, and what is extended at an angle down from that on each side, where the indentations are less conspicuous than in the upper pa t of the suture, they called *additamentum suturæ lambdoidis.*‖

This suture is sometimes very irregular, being made up of a great many small sutures, which surround so many little bones that are generally larger and more conspicuous on the external surface of the skull, than internally. These bones are generally called *triquetra* or *Wormiana*; but some other name ought to be given them, for they are not always of a triangular figure; and older anatomists § than Glaus Wormitts ** have described them. The specific virtue which these bones were once thought to have in the cure of the epilepsy* is not now ascribed to them; and anatomists generally agree, that their formation is owing to a greater number of points than ordinary of ossification in the skull, or to the ordinary bones of the cranium not extending their ossification far enough or soon enough; in which case, the unossified interstice between such bones begins a separate ossification in one or more points; from which the ossification is extended to form as many distinct bones as there were points that are indented into the large ordinary bones, and into each other. Probably those children who have a large opening in this place at their birth, will have the largest ossa triquetra. To confirm this account of the formation of the little bones, we may remark, that such bones are sometimes seen in other sutures, as well as in the lambdoid,† and they are sometimes in one table of the skull, and not in the other.‡

The sagittal suture ‖ is placed longitudinally in the middle of the upper part of the skull, and commonly terminates at the middle of the coronal, and of the lambdoid sutures; between which it is said to be placed, as an arrow is between the string and bow. However, this suture is frequently continued through the middle of the os frontis, down to the root of the nose; which, some § say oftener happens in women than men; but others ** alledge, that it is to be met with more frequently in male skulls than in female: among the skulls which I have seen thus divided, the female are the most

* Στεφαναῖα, arcualis, puppis.

† Laudæ, proræ hypsyloides.

‡ Vesal. Anat. lib. 1. cap. 6.

‖ Lambdoides harmonialis, lambdoides inferior, occipites corona.

§ Eustach. Ossium examen. Bauhin Theat. anat. lib. 3. cap. 5. Paaw in Hippocrat. de vulner. cap. p. 56.

** Musæum, lib. 3. cap. 26.

* Bauhin. et Paaw. ibid. Bartholin. Anat reform. lib. 4. cap. 5. Hildan. Epistol. 65.

† See Examples in Vesal. lib. 1. cap. 6. fig. 4. Paaw. in Hippocrat. de cap. vuln. Bartholin. Hist. anat. cent. 1. hist. 51. Ruysch. Mus. anat. Sue Trad. d'Osteolog. p. 47.

‡ Hunald. in Mem. de l'acad. des sciences, 1730.

‖ Ῥαβδοειδὴς, ὀβελαία ἐπιζευγνυσα, Instar virgæ. nervalis, instar teli, instar veru, secundum capitis longitudinem prorepens, conjungens, columnalis, recta, acualis.

§ Riolan. Comment. de ossib. cap. 8.

** Vesal. lib. 1. cap. 6. et in epitome.

numerous.

numerous. Several * have delineated and described the sagittal suture, sometimes dividing the occipital bone as far down as the great hole through which the medulla spinalis passes. This I never saw.

In some old skulls that are in my possession, there is scarce a vestige of any of the three sutures which I have now described. In other heads, one or two of the sutures only disappear; but I never could discover any reason for thinking them disposed in such different manners in skulls of different shapes, as some ancients alledge they are.†

The squamous agglutinations, or false sutures,‡ are one on each side, a little above the ear, of a semicircular figure, formed by the over-lopping (like one scale upon another) of the upper part of the temporal bones on the lower part of the parietal, where, in both bones, there are a great many small rifings and furrows, which are indented into each other; though these inequalities do not appear till the bones are separated. In some skulls indeed, the indentations here are as conspicuous externally as in other sutures;‖ and what is commonly called the posterior part of this squamous suture, always has the evident serrated form; and therefore is reckoned by some § a distinct suture, under the name of *additamentum posterius suturæ squamosæ*. I have seen two squamous sutures on the same temple, with a semicircular piece of bone between them.**

We ought here to remark, that the true squamous sort of suture is not confined to the conjunction of the temporal and parietal bones, but is made use of to join all the edges of bones on which each temporal muscle is placed:* for the two parts of the sphenoidal suture which are continued from the anterior end of the common squamous suture just now described, of which one runs perpendicularly downwards, and the other horizontally forwards, and also the lower part of the coronal suture already taken notice of, may all be justly said to pertain to the squamous suture. The manner how I imagine this sort of suture is formed at these places is, that by the action of the strong temporal muscles on one side, and by the pressure of the brain on the other, the bones are made so thin, that they have not large enough surfaces opposed to each other to stop the extension of their fibres in length, and thus to cause the common serrated appearance of sutures explained before, but the narrow edge of the one bone slides over the other. The squamous form is also more convenient here; because such thin edges of bones, when accurately applied one to another, have scarce any rough surface to obstruct or hurt the muscle in its contraction; which is still farther provided for, by the manner of laying these edges on each other; for on viewing their outside, we see the temporal bones covering the sphenoidal and parietal, and this last supporting the sphenoidal, while both mount on the frontal; from which disposition it is evident, that while the temporal muscle is contracting, which is the only time it presses strongly in its motion on the bones, its fibres slide easily over the external edges. Another advantage still in this is, that all this bony part is made stronger by the bones thus supporting each other.

The bones of the skull are joined to those of the face, by schyndelesis and sutures. The schyndelesis is in the partition of the nose. The sutures said to be common to the cranium and face are five, viz. the ethmoidal, sphenoidal, transverse, and two zygoma-

* Vesal. lib. 1. cap. 5. fig. 3. 4. et in text cap. 6. Paaw. in Celf. de re medic. cap. 1. Laurent. Hist. anat. lib. 2. cap. 16.

† Hippocrat. de vulner. capitis, sect. 1. Galen, de offib. et de usu part. lib. 9. cap. 17.

‡ Δεπιδοειδῆ, προσκολλήματα κοτοφαι, temporales, certicales, mendosæ, harmoniales, commissuræ in unguem.

‖ Columb. de re anat. lib. 1. cap. 4. Dionis, Anat. 3. demonst. des os.

§ Albin. de offib. sect. 54.

** Sue Trad. d'osteolog. p. 48.

* Vesal. Anat. lib. 1. cap. 6. Winslow, Mem. de l'acad. des sciences, 1720.

tic. Parts however of these sutures are at the junction of only the bones of the skull.

The ethmoidal and sphenoidal sutures surround the bones of these names; and in some places help to make up other sutures, particularly the squamous and transverse; and in other parts there is but one suture common to these two bones.

The transverse suture is extended quite across the face, from the external canthus of one orbit to the same place of the other, by sinking from the canthus down the outside of the orbit to its bottom; then mounting upon its inside, it is continued by the root of the nose down the internal part of the other orbit, and rises up again on its outside to the other canthus. It may be here remarked, that there are some interruptions of this suture in the course I have described; for the bones are not contiguous every where, but are separated, to leave holes and apertures, to be mentioned hereafter.

The zygomatic sutures are one on each side, being short, and slanting from above obliquely downwards and backwards, to join a process of the cheek-bones to one of the temporal bones, which advances towards the face; so that the two processes thus united, form a sort of bridge, or jugum, under which the temporal muscle passes; on which account the processes and suture joining them, have been called *zygomatic*.

It must be observed that the indentations of the sutures do not appear on the inside of the cranium, by much so strong as on the outside; but the bones seem almost joined in a streight line, nay, in some skulls, the internal surface is found entire, while the sutures are manifest without; which may possibly be owing to the less extent of the concave than of the convex surface of the cranium, whereby the fibres of the internal side would be stretched farther out at the edges of the bones, than the exterior ones, if they were not resisted. The resistances are the fibres of the opposite bone, the parts within the skull, and the diploe; of which the last being the weakest, the most advanced fibres, or serræ, run into it, and leave the contiguous edges equal, and more ready to unite: whereas the serræ of the external table have space enough for their admission between the fibres of the opposite bone, and therefore remain of the indented form, and are less liable to the concretion, whereby the sutures are obliterated.* By this mechanism there is no risk of the sharp points of the bones growing inwards, since the external serræ of each of the conjoined bones rest upon the internal smooth-edged table of the other; and external forces applied to these parts are strongly resisted, because the sutures cannot yield, unless the serrated edges of the one bone, and the plain internal plate of the other, are broken.†

The advantages of the sutures of the cranium are these:—1. That this capsula is more easily formed and extended into a spherical figure, than if it had been one continued bone. 2. That the bones which are at some distance from each other at birth, might then yield, and allow to the head a change of shape, accommodated to the passage it is engaged in. Whence, in hard labour of child-bed, the bones of the cranium, instead of being only brought into contact, are sometimes made to mount one upon the other. 3. It is alledged, that through the sutures, there is a transpiration of steams from the brain, which was the old doctrine; or some communication of the vessels without, and of those within the skull, larger here than in any other part of the cranium, according to some moderns; and therefore cucuphæ, fomentations, cataplasms, cephalic plasters, blisters, are applied, and issues are eroded, or cut in the head, at those places where the sutures are longest in forming,

* Hunauld, Memoires de l'acad. des sciences, 1730.

† Winslow, Memoires de l'acad. des sciences, 1720.

and

and where the connection of the bones is afterwards looſeſt, for the cure of a phrenitis, mania, inveterate head-ach, epilepſy, apoplexy, and other diſeaſes of the head. The favourers of the doctrine of tranſpiration, or communication of veſſels at the ſutures, endeavour to ſupport it by obſervations of perſons ſubject to head-achs which cauſed death, from the ſutures being too cloſely united.* 4. That the dura mater may be more firmly ſuſpended by its proceſſes, which inſinuate themſelves into this conjunction of the bones; for doing this equally, and where the greateſt neceſſity of adheſion is, the ſutures are diſpoſed at nearly equal diſtances, and the large reſervoirs of blood, the ſinuſes, are under or near them. 5. That fractures might be prevented from reaching ſo far as they would in a continued bony ſubſtance. 6. That the connection at the ſutures being capable of yielding, the bones might be allowed to ſeparate; which has given great relief to patients from the violent ſymptoms which they had before this ſeparation happened.† And it ſeems reaſonable to believe, that the opening of the ſutures was of great benefit to ſeveral others who were rather judged to have been hurt by it;‡ for we muſt think, that the conſequences of ſuch a force acting upon the brain, as was capable of thruſting the bones aſunder, muſt have been fatal, unleſs it had been thus yielded to.

Having gone through the general ſtructure of the cranium, I now proceed to examine each bone of which that brain-caſe conſiſts, in the order in which I firſt named them.

The *OS FRONTIS*‖ has its name from its being the only bone of that part of the face we call the *forehead*, though it reaches a good deal farther. It has ſome reſemblance in ſhape to the ſhell of the concha bivalvis, commonly called the *cockle*; for the greateſt part of it is convex externally, and concave internally, with a ſerrated circular edge; while the ſmaller part has proceſſes and depreſſions, which make it of an irregular figure.

The external ſurface of the os frontis, is ſmooth at its upper convex part, but ſeveral proceſſes and cavities are obſervable below; for, at each angle of each orbit, the bone juts out, to form four proceſſes, two internal, and as many external; which, from this ſituation, may well enough be named *angular*. Between the internal and the external angular proceſſes of each ſide, an arched ridge is extended, on which the eye-brows are placed. Very little above the internal end of each of theſe ſuperciliary ridges, a protuberance may be remarked, in moſt ſkulls, where there are large cavities, called *ſinuſes*, within the bone; of which hereafter. Betwixt the internal angular proceſſes, a ſmall proceſs riſes, which forms ſome ſhare of the noſe, and thence is named *naſal*. Some obſerve a protuberant part on the edge of the bone behind each external angular proceſs, which they call *temporal* proceſſes; but theſe are inconſiderable. From the under part of the ſuperciliary ridges, the frontal bone runs a great way backwards; which parts may juſtly enough be called *orbitar* proceſſes. Theſe, contrary to the reſt of this bone, are concave externally, for receiving the globes of the eyes, with their muſcles, fat, &c.

In each of the orbitar proceſſes, behind the middle of the ſuperciliary ridges, a conſiderable ſinuoſity is obſerved, where the glandula innominata Galeni, or lachrymalis, is lodged. Behind each internal angular proceſs, a ſmall pit may be remarked, where the cartilaginous pully of the muſcu-

lus

* Columb. de re anat. lib. 1. cap. 5. Verduc. nouvelle oſteologie. chap. 14. Dionis, Anat. 3. demonſtr. des os.

† Ephemerid. Germanic. dec. 1. ann. 4. et 5. obſerv. 33

‡ Ephemorid. Germ. dec. 2. ann. 9. obſ. 230. Ibid. cent. 10. obſ. 31. Vander Linden Medicin. phyſ. cap. 8. art. 4. ſect. 16. Hildan Obſerv. cent. 1. obſ. 1. cent. 2. obſ. 7. Bauchin Theat. anat. lib. 3. cap. 6. Pechlin. Obſerv. lib. 2. obſerv. 30.

‖ Μετῶπον, Βρέγμα, coronale, inverecundum, puppis, ſenſus communis, ſincipitis.

lus obliquus major of the eye is fixed. Betwixt the two orbitar processes, there is a large discontinuation of the bone, into which the cribriform part of the os ethmoides is incased. The frontal bone frequently has little caverns formed in it here where it is joined to the ethmoid bone. Behind each external angular process, the surface of the frontal bone is considerably depressed where part of the temporal muscle is placed.

The foramina, or holes, observable on the external surface of the frontal bone, are three in each side. One in each superciliary ridge, a little removed from its middle towards the nose; through which a twig of the ophthalmic branch of the fifth pair of nerves passes out of the orbit, with a small artery from the internal carotid, to be distributed to the teguments and muscles of the forehead. These vessels in some skulls make furrows in the os frontis, especially in the bones of children, as has also been observed of another considerable vessel of this bone near its middle;* and therefore we ought to be aware of transverse incisions on either side of the os frontis, which might either open these vessels or hurt the nerves while they are yet in part within the bone; for, when vessels are thus wounded, it is difficult to stop the hæmorrhage, because the adhesion of a part of the artery to the bone hinders its contraction, and consequently styptics can have little effect; the sides of the furrow keep off compressing substances from the artery; and we would wish to shun cauteries or escharotics, because they make the bone carious; and nerves, when thus hurt, sometimes produce violent symptoms. But, to return to the superciliary foramina, we must remark, that often, instead of a hole, a notch only is to be seen: nay, in some skulls, scarce a vestige even of this is left; in others, both hole and notch are observable, when the nerve and artery run separately. Frequently a hole is found on one side, and a notch on the other; at other times we see two holes; or there is a common hole without, and two distinct entries internally. The reason of this variety of a hole, notch, depression, or smoothness, in the superciliary ridge, is the different length and tension of the nerves and vessels; the shorter they are, the more they are sunk into the bone as it grows. Near the middle of the inside of each orbit, hard by, or in the transverse suture, there is a small hole for the passage of the nasal twig of the first branch of the fifth pair of nerves, and of a branch of the ophthalmic artery. This hole is sometimes entirely formed in the os frontis; in other skulls, the sides of it are composed of this last bone, and of the os planum. It is commonly known by the name of *orbitarium internum*, though *anterius* should be added, because of the next, which is commonly omitted. This, which may be called *orbitarium internum posterius*, is such another as the former, only smaller, and about an inch deeper in the orbit: through it a small branch of the ocular artery passes to the nose. Besides these six, there are a great number of small holes observable on the outer surface of this bone, particularly in the two protuberances above the eye-brows. Most of these penetrate no farther than the sinuses, or than the diploe, if the sinuses are wanting; though sometimes I have seen this bone so perforated by a vast number of these small holes, that, placed between the eye and a clear light, it appeared like a sieve. In the orbit of the generality of skeletons, we may observe one, two, or more holes, which allow a passage to a hog's bristle through the skull. The place, size, and number of these, are however uncertain. They generally serve for the transmission of small arteries or nerves.

The internal surface of the os frontis is concave, except at the orbitar processes, which are convex, to support the anterior lobes of the brain. This surface is not so smooth as the external

* Ruysch. Mus. anat. theca D. reposit. 4. No. 3.

external; for the larger branches of the arteries of the dura mater make some furrows in its sides and back parts. The sinuosities from the luxuriant risings of the brain, mentioned when describing the general structure of the cranium, are often very observable on its upper part; and its lower and fore parts are marked with the contortions of the anterior lobes of the brain. Through the middle of this internal surface, where always in children, and sometimes in old people, the bone is divided, either a ridge stands out, to which the upper edge of the falx is fastened, or a furrow runs, in which the upper side of the superior longitudinal sinus is lodged: on both these accounts chirurgical authors justly discharge the application of the trepan here. The reason of this difference in skulls, is alledged by some authors to be this: that in thin skulls the ridge strengthens the bones, and in thick ones there is no occasion for it. To this way of accounting for this phœnomenon, it may justly be objected, that generally very thick skulls have a large spine here, and frequently thin ones have only a furrow. Perhaps this variety may be owing to the different times of complete ossification of those parts in different subjects; for if the two sides of this bone meet before they arrive at their utmost extent of growth, they unite very firmly, and all their fibres endeavour to stretch themselves out where the least resistance is, that is, between the hemispheres of the brain. To support this reasoning, we may remark, that those adults, whose frontal bone is divided by the sagittal suture, never have a ridge in this place.

Immediately at the root of this ridge or furrow there is a small hole, which sometimes pierces through the first table, and, in other skulls, opens into the superior sinus of the ethmoid bone within the nose. In it a little process of the falx is lodged, and a small artery, and sometimes a vein runs;* and the superior longitudinal sinus begins here. This hole, however, is often not entirely proper to the os frontis; for in several skulls, the lower part of it is formed in the upper part of the base of the crista galli, which is a process of the ethmoid bone.*

The os frontis is composed of two tables, and an intermediate diploe, as the other bones of the cranium are, and, in a middle degree of thickness between the os occipitis and the parietal bones; is pretty equally dense all through, except at the orbitar processes, where, by the action of the eye on one side, and pressure of the lobes of the brain on the other, it is made extremely thin and diaphanous, and the meditullium is entirely obliterated. Since in this place there is so weak a defence for the brain, the reason appears why fencers esteem a push in the eye mortal.†

The diploe is also exhausted in that part above the eye-brows, where the two tables of the bone separate, by the external being protruded outwards, to form two large cavities, called *sinus frontales*. These are divided by a middle perpendicular bony partition. Their capacities in the same subject are seldom equal; in some the right, in others the left is largest. And in different bones their size is as inconstant; nay, I have examined some, where they were entirely wanting; which oftener happens in such as have a flat forehead, and whose sagittal suture is continued down to the nose, than in others.‡ In some skulls, besides the large perpendicular septem, there are several bony pillars, or short partitions, found in each sinus; in others these are wanting. For the most part the septum is entire; at other times it is discontinued, and the two sinuses communicate. When the sinuses are seen in such skulls as have the frontal bone divided by the sagittal suture,

* Morgagn. Adversar. 6. animad. 31.

* Ingrass. Comment. in Galen. de ossib. cap. 1. comment. 8.

† Ruysch Observ. anat. chir. observ. 54. Diemerbroeck. Anat. lib. 3. cap. 10. Bonet. Sepulch. anat. lib. 4. sect 3. observ. 17.

‡ Fallop, Exposit. de ossibus, cap. 13.

ſuture, the partition dividing theſe cavities is evidently compoſed of two plates, which eaſily ſeparate. Each ſinus commonly opens by a roundiſh ſmall hole, at the inner and lower part of the internal angular proceſſes, into a ſinus formed in the noſe, at the upper and back part of the os unguis; near to which there are alſo ſome other ſmall ſinuſes of this bone,* the greater part of which open ſeparately nearer the ſeptum narium, and often they terminate in the ſame common canal with the large ones.

In a natural and ſound ſtate, theſe cavities are of conſiderable advantage; for the organ of ſmelling being thus enlarged, the effluvia of odorous bodies more difficultly eſcape it; and their impreſſions being more numerous, are therefore ſtronger, and affect the organ more. That odorous particles may be applied to the membrane of the ſinuſes, is evident from the pain felt in this part of the forehead, when the effluvia of volatile ſpirits or of ſtrong aromatics, are drawn up into the noſe by a quick inſpiration. Theſe and the other cavities which open into the noſe, increaſe the ſound of our voice, and render it more melodious, by ſerving as ſo many vaults to reſound the notes. Hence people labouring under a coryza, or ſtoppage of the noſe from any other cauſe, when they are by the vulgar, though falſely, ſaid to ſpeak through their noſe, have ſuch a diſagreeable harſh voice. The liquor ſeparated in the membrane of theſe ſinuſes, drills down upon the membrane of the noſe to keep it moiſt.

From the deſcription of theſe ſinuſes, it is evident how uſeleſs, nay, how pernicious it muſt be, to apply a trepan on this part of the ſkull; for this inſtrument, inſtead of piercing into the cavity of the cranium, would reach no farther than the ſinuſes; or, if the inner table was perforated, any extravaſated blood that happened to be within the ſkull, would not be diſcharged outwardly, but would fall into the ſinuſes, there to ſtagnate, corrupt, and ſtimulate the ſenſible membranes; from which alſo there would be ſuch a conſtant flow of glairy mucus, as would retard, if not hinder a cure, and would make the ſore degenerate into an incurable fiſtula. Beſides, as it would be almoſt impoſſible in this caſe to prevent the air paſſing through the noſe, from having conſtant acceſs to the dura mater, or brain, ſuch a corruption would be brought on theſe parts as would be attended with great danger. Farther, in reſpiration, the air ruſhing violently into theſe cavities of the os frontis, and paſſing through the external orifice, whenever it was not well covered and defended, would not only prevent the cloſing up of the external orifice, but might otherwiſe bring on bad conſequences.* The membrane lining theſe ſinuſes is ſo ſenſible, that inflammations of it muſt create violent torture;† and worms, or other inſects, crawling there, muſt give great uneaſineſs.‡

The upper circular part of the os frontis, is joined to the oſſa parietalia, from one temple to the other, by the coronal ſuture. From the termination of the coronal ſuture, to the external angular proceſſes, this bone is connected to the ſphenoid by the ſphenoidal ſuture. At the external canthi of the eyes, its angular proceſſes are joined by the tranſverſe ſuture to the oſſa molarum, to which it adheres one third down the outſide of the orbits; whence to the bottom of theſe cavities, and a little up on their internal ſides, theſe orbitar proceſſes are connected to the ſphenoidal bone by that ſame ſuture. In ſome few ſkulls, however, a diſcontinuation of theſe two bones appears at the upper part of the long ſlit, near the bottom of the orbit.

* Cowper in Drake's Anthropolog. book 3, chap. 10.

* Paaw, de oſſibus, pars. 1. cap. 7. Palfyne Anatom. chir. traite 4. chap. 15. Nouvelle oſteologie, partie 2. chap. 3.

† Fernel. Partholog. lib. 5. cap. 7. Saltzman Decur. obſerv. 10.

‡ Fernel. Partholog. lib. 5. cap. 7. Bartholin. Epiſtol. medic. cent. 2. epiſt. 74. Hiſt. de l'acad. des ſciences, 1708 & 1733.

On the inside of each orbit, the orbitar process is indented between the cribriform part of the ethmoid bone, and the os planum and unguis. The transverse suture afterwards joins the frontal bone to the superior nasal processes of the ossa maxillaria superiora, and to the nasal bones. And, lastly, its nasal process is connected to the nasal lamella of the ethmoid bone.

The frontal bone serves to defend and support the anterior lobes of the brain. It forms a considerable part of the cavities that contain the globes of the eyes, helps to make up the septum narium, organ of smelling, &c. From the description of the several parts, the other uses of this bone are evident.

In a ripe child, the frontal bone is divided through the middle; the superciliary holes are not formed; often a small round piece of each orbitar process, behind the superciliary ridge, is not ossified, and there is no sinus to be seen within its substance.

Each of the two *ossa parietalia*,* or bones serving as walls to the encephalon, is an irregular square; its upper and fore sides being longer than the one behind or below. The inferior side is a concave arch; the middle part receiving the upper round part of the temporal bone. The angle formed by this upper side, and the fore one, is so extended, as to have the appearance of a process.

The external surface of each os parietale is convex. Upon it, somewhat below the middle height of the bone, there is a transverse arched ridge, of a whiter colour generally than any other part of the bone; from which, in bones that have strong prints of muscles, we see a great many converging furrows, like so many radii drawn from a circumference towards a center. From this ridge of each bone, the temporal muscle rises; and, by the pressure of its fibres, occasions the furrows just now mentioned. Below these we observe, near the semicircular edges, a great many risings and depressions, which are joined to like inequalities on the inside of the temporal bone, to form the squamous suture. The temporal bone may therefore serve here as a buttress, to prevent the lower side of the parietal from starting outwards when its upper part is pressed or struck.*

Near the upper sides of these bones, towards the hind part, is a small hole in each, through which a vein passes from the teguments of the head to the longitudinal sinus. Sometimes I have seen a branch of the temporal artery pass through this hole, to be distributed to the upper part of the falx, and to the dura mater at its sides, where it had frequent anastomoses with the branches of the arteries derived from the external carotids, which commonly have the name of the arteries of the dura mater, and with the branches of the internal carotids which serve the falx. In several skulls, one of the ossa parietalia has not this hole: in others, there are two in one bone; and in some not one in either. Most frequently this hole is through both tables; at other times the external table is only perforated. The knowledge of the course of these vessels may be of use to surgeons, when they make any incision near this part of the head, least if the vessels are rashly cut near the hole, they shrink within the substance of the bone, and so cause an obstinate hæmorrhage, which neither ligatures nor medicines can stop.

On the inner concave surface of the parietal bones, we see a great many deep furrows, disposed somewhat like the branches of trees: The furrows are largest and deepest at the lower edge of each os parietale, especially near its anterior angle, where sometimes a full canal is formed. They afterwards divide into small furrows, in their progress upwards. In some skulls a large furrow begins at the hole

* Κορυφῆς, paria, sinciptis, verticis, arcualia, nervalia cogitationis, rationis, bregmatis, madefactionis.

* Hunauld in Mem. de l'acad. des sciences, 1730.

hole near the upper edge, and divides into branches, which join with those which come upwards, shewing the communications of the upper and lower vessels of the dura mater. In these furrows we frequently see passages into the diploe; and sometimes I have observed canals going off, which allowed a small probe to pass some inches into the bony substance. Some * tell us, that they have observed these canals piercing the bone towards the occiput. On the inside of the upper edge of the ossa parietalia, there is a large sinuosity, frequently larger in the bone on one side than on the other, where the upper part of the falx is fastened, and the superior longitudinal sinus is lodged. Generally part of the lateral sinuses makes a depression near the angle, formed by the lower and posterior sides of these bones; and the pits made by the prominent parts of the brain are to be seen in no part of the skull more frequent, or more considerable, than in the internal surface of the parietal bones.

The ossa parietalia are amongst the thinnest bones of the cranium; but enjoy the general structure of two tables and diploe the completest, and are the most equal and smooth.

These bones are joined at their foreside to the os frontis by the coronal suture; at their long inferior angles, to the sphenoid bone, by part of the suture of this name; at their lower edge, to the ossa temporum, by the squamous suture, and its posterior additamentum; behind, to the os occipitis, or ossa triquetra, by the lambdoid suture; and above, to one another, by the sagittal suture.

They have no particular uses besides those mentioned in the description of their several parts, except what are included in the account of the general structure of the cranium.

In a child born at the full time, none of the sides of this bone are completed; and there never is a hole in the ossified part of it near to the sagittal suture.

The large unossified ligamentous part of the cranium, observable between the parietal bones, and the middle of the divided os frontis of new-born children, called by the vulgar the *open of the head*, was imagined by the ancients to serve for the evacuation of the superfluous moisture of the brain; and therefore they named it *bregma*,* or the fountain; sometimes adding the epiphet *pulsatilis*, or beating, on account of the pulsation of the brain felt through this flexible ligamento-cartilaginous substance. Hence very frequently the parietal bones are called *ossa bregmatis*.

The upper middle part of the head of a child, in a natural birth, being what presents itself first at the os uteri,† an accoucheur may reach the bregma with his finger, when the os uteri is a little opened. If the bregma is stretched, and the pulsation of the brain is felt through it, the child is certainly alive: but if it is shrivelled and flaccid, without any observable pulsation in it, there is some reason to suspect the child to be very weak, or dead. Those who practise midwifery should therefore examine the state of the bregma accurately.

All the bregma is generally ossified before seven years of age. Several authors ‖ say, they have observed it unossified in adults; and physicians, who order the application of medicines at the meeting of the coronal and sagittal sutures, seem yet to think that a derivation of noxious humours from the encephalon is more easily procured at this part than any other of the skull; and that medicines have a greater effect here than elsewhere, in the internal disorders of the head.

* Cowper. Anatom. explic. of 90. tab. 8. 2.

* Palpitans vertex, foliolum, folium, triangularis lacuna.

† Burton's Midwifery, sect. 51. Smellie's Midwifery, book 1. chap. 1. sect. 5.

‖ Bartholin. Anat. reform. lib. 4. cap. 6. Diemerbroek Anat. lib. 9. cap. 6. Kerkring. Osteogen. cap. 2.

OSSA

*OSSA TEMPORUM,** so named, say authors, from the hair first becoming grey on the temples, and thus discovering people's ages, are each of them equal and smooth above, with a very thin semicircular edge; which, from the manner of its connection with the neighbouring bones, is distinguished by the name of *os squamosum*. Behind this the upper part of the temporal bone is thicker, and more unequal, and is sometimes described as a distinct part, under the name of *pars mammillaris*.† Towards the base of the skull, the temporal bone appears very irregular and unequal; and this part, instead of being broad, and placed perpendicularly, as the others are, is contracted into an oblong very hard substance, extended horizontally forwards and inwards, which in its progress becomes smaller, and is commonly called *os petrosum*.

Three external processes of each temporal bone are generally described. The first placed at the lower and hind part of the bone, from its resemblance to a nipple, is called *mastoides*, or *mammillaris*. It is not solid, but within is composed of cancelli, or small cells, which have a communication with the large cavity of the ear, the drum; and therefore sounds, being multiplied in this vaulted labyrinth, are increased, before they are applied to the immediate organ of hearing. Into the mastoid process, the sternomastoideus muscle is inserted; and to its back part, where the surface is rough, the trachelomastoideus, and part of the splenius, are fixed.

About an inch farther forward, the second process begins to rise out from the bone; and having its origin continued obliquely downwards and forwards for some way, it becomes smaller; and is stretched forwards to join with the os malæ; they together forming the bony jugum, under which the temporal muscle passes.

Hence this process has been named *zygomatic*.* Its upper edge has the strong aponeurosis of the temporal muscle fixed into it; and its lower part gives rise to a share of the masseter. The fore part of the base of this process is an oblong tubercle, which in a recent subject is covered with a smooth polished cartilage, continued from that which lines the cavity immediately behind this tubercle.—From the under craggy part of the os temporum, the third process stands out obliquely forwards. The shape of it is generally said to resemble the ancient stylus scriptorius: and therefore it is called the *styloid* process.† Some authors ‡ however contend, that it ought to be named *stelloid*, from its being more like to a pillar. Several muscles have their origin from this process, and borrow one half of their name from it; as *stylo-glossus*, *stylo-hyoideus*, *stylo-pharyngeus*; to it a ligament of the os hyoides is sometimes fixed; and another is extended from it to the inside of the angle of the lower jaw. This process is often even in adults not entirely ossified, but is ligamentous at its root, and sometimes is composed of two or three distinct pieces. Round the root of it, especially at the fore-part, there is a remarkable rising of the os petrosum, which some have esteemed a process; and, from the appearance it makes with the styliform, have named it *vaginalis*. Others again have, under the name of *auditory* process, reckoned among the external processes that semicircular ridge, which, running between the root of the mastoid and zygomatic processes, forms the under-part of the external meatus auditorius.

* Κόρταφῶν, κορσῶν, κορρῶν, λεπιδοειδη. πολυειδε, λιθοειδε· temporalia, lapidosa, mendosa, dura, arcualia, tymparum, armalia, saxea, parietalia.

† Albin de ossib. sect. 26.

* Καγκρος, paris, ansæ ossium temporum, ossa arcualia, paria, jugalia, conjugalia.

† Γραιφοειδε, βελονοειδε, πληκτρον, os calaminum, sagittale, clavale, acuale, calcar capitis.

‡ Galen, de usu part. lib. 2. cap. 4. Fallop. observ. anatom.

The

The sinuosities or depressions on the external surface of each os temporum are these: A long fossa at the inner and back part of the root of the mammary process, where the posterior head of the digastric muscle has its origin. Immediately before the root of the zygomatic process, a considerable hollow is left, for lodging the crotaphite muscle. Between the zygomatic, auditory, and vaginal processes, a large cavity is formed; through the middle of which, from top to bottom, a fissure is observable, into which part of the ligament that secures the articulation of the lower jaw with this bone is fixed. The fore-part of the cavity being lined with the same cartilage which covers the tubercle before it, receives the condyle of the jaw; and in the back part a small share of the parotid gland, and a cellular fatty substance, are lodged. At the inside of the root of the styloid apophyse, there is a thimble-like cavity, where the beginning of the internal jugular vein, or end of the lateral sinus is lodged. And as the sinuses of the two sides are frequently of unequal size, so one of these cavities is as often larger than the other.* Round the external meatus auditorius, several sinuosities are formed for receiving the cartilages and ligaments of the ear, and for their firm adhesion.

The holes that commonly appear on the outside of each of these bones, and are proper to each of them, are five. The first, situated between the zygomatic and mastoid processes, is the orifice of a large funnel-like canal, which leads to the organ of hearing; therefore is called *meatus auditorius externus*.† The second gives passage to the portia dura of the seventh pair of nerves, and from its situation between the mastoid and styloid processes, is called *foramen stylo mastoideum*.‖ Some way before, and to the inside of the styloid process, is the third hole; the canal from which runs first upwards, then forwards, and receives into it the internal carotid artery, and the beginning of the intercostal nerve; where this canal is about to make the turn forwards, one, or sometimes two very small holes, go off towards the cavity of the ear, called tympanum; through these Valsalva* affirms the proper artery or arteries of that cavity are sent. On the anterior edge of this bone, near the former, a fourth hole is observable, being the orifice of a canal which runs outwards and backwards, in a horizontal direction, till it terminates in the tympanum. This, in the recent subject, is continued forward and inward, from the parts which I mentioned just now as its orifice in the skeleton, to the side of the nostrils; being partly cartilaginous, and partly ligamentous. The whole canal is named, *Iter a palato ad aurem*, or *Eustachian tube*. On the external side of the bony part of this canal, and at top of the chink in the cavity that receives the condyle of the lower jaw, is the course of the little nerve said commonly to be reflected from the lingual branch of the fifth pair, till it enters the tympanum to run across this cavity, and to have the name of *chorda tympani*. The fifth hole is very uncertain, appearing sometimes behind the mastoid process; sometimes it is common to the temporal and occipital bones, and in several skulls there is no such hole. The use of it, when found, is for the transmission of a vein from the external teguments to the lateral sinus. But in some subjects, a branch of the occipital artery passes through this hole, to serve the back part of the dura matter; in others, I have seen two or three such holes; but they are oftener wanting than found. And we may, once for all, in general remark, that the largeness, number, situation, and existence of all such holes,

* Hunauld. in Mem. de l'acad. des sciences, 1730.

† Πόρος της ακοῆς, οπή τῶν ὠτῶν, fenestra aurium.

‖ Aquaeductus Fallopii.

* De aure humana, cap. 2, sect. 22. et tab. 7. fig. 1.

holes, that for the most part allow only a passage for veins from without to the internal receptacles, are very uncertain.

The internal surface of the ossa temporum is unequal; the upper circular edge of the squamous part having numerous small ridges and furrows for its conjunction with the parietal bones; and the rest of it is irregularly marked with the convolutions of the middle part of the brain, and with furrows made by the branches of the arteries of the dura mater.

From the under part of this internal surface, a larger transverse hard craggy protuberance runs horizontally inwards and forwards, with a sharp edge above, and two flat sides, one facing obliquely forwards and outwards, and the other as much backwards and inwards. To the ridge between these two sides, the large lateral process of the dura mater is fixed.

Sometimes a small bone, a-kin to the sesamoid, is found between the small end of this petrous process and the sphenoid bone.*

Towards the back part of the inside of the os temporum, a large deep fossa is conspicuous, where the lateral sinus lies; and frequently on the top of the petrous ridge, a furrow may be observed, where a small sinus is situated.

The internal proper foramina of each of these bones are, first, the internal meatus auditorius in the posterior plain side of the petrous process. This hole soon divides into two; one of which is the beginning of the aquæduct of Fallopius; the other ends in several very small canals† that allow a passage to the branches of the portio mollis of the seventh pair of nerves, into the vestibule and cochlea.—Through it also an artery is sent, to be distributed to the organ of hearing. The second hole, which is on the anterior plain side of the craggy process, gives passage to a reflected branch of the second branch of the fifth pair of nerves, which joins the portio dura of the auditory nerve, while it is in the aquæduct,* small branches of blood vessels accompanying the nerves or passing through smaller holes near this one. The passage of the cutaneous vein into the lateral sinus, or of a branch of the occipital artery, is seen about the middle of the large fossa for that sinus; and the orifice of the canal of the carotid artery is evident at the under part of the point of the petrous process.

Besides these proper holes of the temporal bones which appear on their external and internal surfaces, there are two others in each side that are common to this bone and to the occipital and sphenoidal bones; which shall be mentioned afterwards in the description of these bones.

The upper round part of the squamous bones is thin, but equal; while the low petrous part is thick and strong, but irregular and unequal, having the distinction of tables and diploe confounded, with several cavities, processes, and bones within its substance, which are parts of the organ of hearing. That a clear idea may be had of this beautiful but intricate organ, anatomists generally chuse to demonstrate all its parts together. I think the method good; and therefore, since it would be improper to insert a complete treatise on the ear here, shall omit the description of the parts contained within the os petrosum of the skeleton.

The temporal bones are joined above to the parietal bones by the squamous sutures, and their posterior additamenta; before, to the sphenoid bone by the suture of that name; to the cheek-bones by the zygomatic sutures; behind, to the occipital bone, by the lambdoid suture and its additamenta; and they are articulated with the lower jaw in the manner which shall be described when this bone is examined.

* Riolan. Comment. de ossib. cap. 32. Winslow, Exposition anatomique de corps humain, trait. des os secs. sect. 266.

† Valsavl. De aure humana, cap. 3. sect. 11.

* Valsalv. De aure, cap. 3. sect. 10.

The

The purposes which these two bones serve, are easily collected, from the general use of the cranium, and from what has been said in the description of their several parts.

In an infant, a small fissure is to be observed between the thin upper part, and the lower craggy part of each of these bones; which points out the recent union of these parts. Neither mastoid nor styloid processes are yet to be seen. Instead of a bony funnel-like external meatus auditorius, there is only a smooth bony ring, within which the membrane of the drum is fastened. At the entry of the Eustatian tube, the side of the tympanum is not completed. A little more outward than the internal auditory canal, there is a deep pit, over the upper part of whose orifice the interior semicircular canal of the ear is stretched; and some way below this, the posterior semicircular canal also appears manifestly.

OS OCCIPITIS,* so called from its situation, is convex on the outside, and concave internally. Its figure is an irregular square, or rather rhomboid; of which the angle above is generally a little rounded; the two lateral angles are more finished, but obtuse; and the lower one is stretched forward in form of a wedge, and thence is called by some the *cuneiform* process. If one would, however, be very nice in observing the several turns which the edges of the os occipitis make, five or seven sides and as many angles of this bone might be described.

The external surface is convex, except at the cuneiform apophyse, where it is flatted. At the base of this triangular process, on each side of the great hole, but more advanced forwards than the middle of it, the large oblong protuberances, named the *condyles*, appear to serve for the articulation of this bone with the first vertebra of the neck. The smooth surface of each of these condyloid processes is longest from behind forwards, whereby their oblique situation, they come much nearer to each other than they are at their back part. Their inner sides are lower than the external, by which they are prevented from sliding to either side out of the cavities of the first vertebra.* In some subjects each of these plain smooth surfaces seems to be divided by a small rising in its middle; and the lower edge of each condyle, next the great foramen, is discontinued about the middle, by an intervening notch: Whence some† alledge, that each of these apophyses is made up of two protuberances. Round their root a small depression and spongy roughness is observable, where the ligaments for surrounding and securing their articulations adhere. Though the motion of the head is performed on the condyles, yet the centre of gravity of that globe does not fall between them, but is a good way farther forward; from which mechanism it is evident, that the muscles which pull the head back, must be in a constant state of contraction; which is stronger than the natural contraction of the proper flexors, else the head would always fall forwards, as it does when a man is asleep, or labours under a palsy, as well as in infants, where the weight of the head far exceeds the proportionable strength of these muscles. This seeming disadvantageous situation of the condyles is however of good use to us, by allowing sufficient space for the cavities of the mouth and fauces, and for lodging a sufficient number of muscles, which commonly serve for other uses, but may at pleasure be directed to act on the head, and then have an advantageous lever to act with, so as to be able to sustain a considerable weight appended, or other force applied, to pull the head back.

Somewhat more externally than the condyles there is a small rising and semilunated hollow in each side, which make part of the holes, common to the occipital and petrous bones. Im-

* Ἰνιον, basilare, proræ, memoriæ, pixidis, fibrosum, nervosum, mabide.

* Galen. de usu part lib. 12. cap. 7.

† Diemerbroek, anat. lib. 9. cap. 6.

mediately behind this, on each ſide, a ſcabrous ridge is extended from the middle of the condyle, towards the root of the maſtoid proceſs. Into this ridge the muſculus lateralis, commonly aſcribed to Fallopius, is inſerted. About the middle of the external convex ſurface, a large arch runs acroſs the bone; from the upper lateral parts of which the occipital muſcles have their riſe; to its middle the trapezii are attached: and half way between this and the great hole, a leſſer arch is extended. In the hollows between the middle of theſe arches the complexi are inſerted; and in the depreſſions more external and farther forward than theſe, the ſplenii are inſerted. Between the middle of the leſſer arch and the great hole, the little hollow marks of the recti minores appear; and on each ſide of theſe the fleſhly inſertions of the obliqui ſuperiores and recti majores make depreſſions. Through the middle of the two arches a ſmall ſharp ſpine is placed, which ſerves as ſome ſort of partition between the muſcles of different ſides, or rather is owing to the action of the muſcles depreſſing the bone on each ſide of it, while this part is free from their compreſſion. Theſe prints of the muſcles on this bone are very ſtrong and plain in ſome ſubjects, but are not ſo diſtinct in others. All round the great foramen the edges are unequal, for the firmer adheſion of the ſtrong circular ligament which goes thence to the firſt vertebra. One end of each lateral or moderator ligament of the head, is fixed to a rough ſurface at the fore part of each condyle, and the perpendicular one is connected to a rough part of the edge of the great hole between the two condyles. Immediately before the condyles, two little depreſſions are made in the external ſurface of the cuneiform proceſs, for the inſertion of the recti anteriores minores muſcles which are unjuſtly aſcribed to Cowper: and ſtill farther forward, near the ſphenoid bone, are two other ſuch depreſſions, for the reception of the recti anteriores majores. When we conſider the ſize of the prints of muſcles on the occipital bone, before and behind its condyles, and, at the ſame time, compare their diſtances from theſe centres of motion of the head, we muſt ſee how much ſtronger the muſcles are which pull the head backwards, than thoſe are which bend it forward; and how much greater force the former acquire by the long lever they act with, than the latter which are inſerted ſo near the condyles. This great force in the extenſor muſcles is altogether neceſſary, that they might not only keep the head from falling forward in an erect poſture, but that they might ſupport it when we bow forward in the moſt neceſſary offices of ſocial life, when the weight of the head comes to act at right angles on the vertebræ of the neck, and obtains a long lever to act with.

On the inner ſurface of the os occipitis we ſee too ridges; one ſtanding perpendicular, the other running horizontally acroſs the firſt. The upper part of the perpendicular limb of the croſs, to which the falx is fixed, is hollowed in the middle, or often on one ſide, for the reception of the ſuperior longitudinal ſinus, and the lower part of it has the ſmall or third proceſs of the dura mater faſtened to it, and is ſometimes hollowed by the occipital ſinus. Each ſide of the horizontal limb is made hollow by the lateral ſinuſes incloſed in the tranſverſe proceſs of the dura mater; the foſſa in the right ſide being generally a continuation of the one made by the longitudinal ſinus in the perpendicular limb, and therefore is larger than the left one.* Round the middle of the croſs there are four large depreſſions ſeparated by its limbs; the two upper ones being formed by the back part of the brain, and the two lower ones by the cerebellum. Farther forward than the laſt-mentioned depreſſions, is the lower part of the foſſa for the lateral ſinus on each ſide. The inner ſurface of the cuneiform

* Morgagn. Adverſ. anat. 6. animad. 1.

apophyſe

apophyſe is made concave for the reception of the medulla oblongata, and of the baſilar artery. A furrow is made on each ſide, near the edges of this proceſs, by a ſinus of the dura mater, which empties itſelf into the lateral ſinus.*

The holes of this bone are commonly five proper, and two common to it and to the temporal bones. The firſt of the proper holes, called *foramen magnum* † from its ſize, is immediately behind the wedge-like proceſs, and allows a paſſage to the medulla oblongata, nervi acceſſorii, to the vertebral arteries, and ſometimes to the vertebral veins. At each ſide of this great hole, near its fore part, and immediately above the condyles, we always find a hole, ſometimes two, which ſoon unite again into one that opens externally; through theſe the ninth pair of nerves go out of the ſkull. The fourth and fifth holes pierce from behind the condyle of each ſide into the foſſæ of the lateral ſinuſes; they ſerve for the paſſage of the cervical veins to theſe ſinuſes. Often one of theſe holes is wanting, ſometimes both, when the veins paſs through the great foramen. Beſides theſe five, we frequently meet with other holes near the edges of this bone, for the tranſmiſſion of veins; but their number and diameter are very uncertain. The two common foramina are the large irregular holes, one in each ſide, between the ſides of the cuneiform proceſs, and the edges of the petrous bones. In a recent ſubject, a ſtrong membrane runs acroſs from one ſide to the other of each of theſe holes; in ſome heads I have ſeen this membrane oſſified, or a bony partition dividing each hole; and in the greater number of adult ſkulls, there is a ſmall ſharp-pointed proceſs ſtands out from the os petroſum, and a more obtuſe riſing in the occipital bone, between which the partition is ſtretched. Behind this partition, where the largeſt ſpace is left, the lateral ſinus has its paſſage; and before it the eight pair of nerves and acceſſorius make their exit out of the ſkull; and ſome authors ſay, an artery paſſes through this hole, to be beſtowed on the dura mater.

The occipital bone is among the thickeſt of the cranium, though unequally ſo; for it is ſtronger above, where it has no other defence than the common teguments, than it is below, where being preſſed by the lobes of the brain and cerebellum on one ſide, and by the action of the muſcles on the other, it is ſo very thin, as to be diaphanous in many ſkulls; but then theſe muſcles ward off injuries, and the ridges and ſpines, which are frequent here, make it ſufficiently ſtrong to reſiſt ordinary forces. The tables and diploe are tolerably diſtinct in this bone, except where it is ſo thin as to become diaphanous.

The occipital bone is joined above to the oſſa parietalia and triquetra when preſent, by the lambdoid ſuture; laterally to the temporal bones, by the additamenta of the lambdoid ſuture; below to the ſphenoid bone, by the end of its cuneiform proceſs, in the ſame way that epiphyſes and their bones are joined: for in children a ligamentous cartilage is interpoſed between the occipital and ſphenoid bones, which gradually turns thinner, as each of the bones advances, till their fibres at laſt run into each other; and, about ſixteen or eighteen years of age, the union of theſe two bones becomes ſo intimate, that a ſeparation cannot be made without violence. The os occipitis is joined by a double articulation to the firſt vertebra of the neck, each condyle being received into a ſuperior oblique proceſs of that vertebra. What motion is allowed here, we ſhall conſider afterwards, where the vertebræ are deſcribed.

The uſes of this bone appear from the preceding deſcription, and therefore need not be repeated.

An infant born at the full time has this bone divided, by unoſſified cartilages,

* Albin. de oſſib. ſect. 65.

† Rachitidis, Medulæ ſpinalis.

lages, into four parts. The first of these is larger than the other three, is of a triangular shape, and constitutes all the part of the bone above the great foramen. Generally fissures appear in the upper part and sides of this triangular bone, when all the cartilage is separated by maceration; and sometimes little distinct bones are seen towards the edges of it. The second and third pieces of this bone are exactly alike, and situated on each side of the great foramen; from which very near the whole condyles are produced; and they are extended forwards almost to the fore part of the hole for the ninth pair of nerves. The fourth piece is the cuneiform process, which forms a small share of the great hole, and of these for the ninth pair of nerves, and of the condyles: betwixt it and the sphenoid bone, a cartilage is interposed.

Of the eight bones which belong to the cranium, there are only two which are not yet described, viz. the ethmoid and sphenoid. These we already mentioned, in complaisance to the generality of writers on this subject, as bones common to the cranium and face, because they enter into the composition of both; but the same reason might equally be used for calling the frontal bone a common one too. I shall, however, pass any idle dispute about the propriety of rangeing them, and proceed to examine the structure of the bones themselves.

OS ETHMOIDES,* or the sieve-like bone, has got its name from the great number of small holes with which that part of it first taken notice of is pierced. When this bone is entire, the figure of it is not easily described; but, by a detail of its several parts, some idea may be afforded of the whole; and therefore I shall distinguish it into the cribriform lamella with its process, the nasal lamella, cellulæ, and ossa spongiosa.

The thin horizontal lamella, is all (except its back part) pierced obliquely by a great number of small holes, through which the filaments of the olfactory nerves pass. In a recent subject, these holes are so closely lined by the dura mater, that they are much less conspicuous than in the skeleton. From the middle of the internal side of this plate, a thick process rises upwards, and, being highest at the fore part, gradually becomes lower, as it is extended backwards. From some resemblance which this process was imagined to have to a cock's comb, it has been called *crista galli*.* The falx is connected to its ridge, and to the unperforated part of the cribriform plate. When the crista is broke, its base is sometimes found to be hollow, with its cavity opening into the nose.† Immediately before the highest part of this process, is the blind hole of the frontal bone, which, as was formerly remarked, is often in a good measure formed by a notch in the fore part of the root of the crista.

From the middle of the outer surface of the cribriform lamella, a thin solid plate is extended downward and forward, having the same common base with the crista galli. Generally it is not exactly perpendicular, but is inclined to one side or other, and therefore divides the cavity of the nose unequally. Its inclination to one side, and flexure in the middle, is sometimes so great, that it fills up a large share of one of the nostrils, and has been mistaken for a polypus there. It is thin at its rise, and rather still thinner in its middle; yet afterward, toward its lower edge, it becomes thicker, that its conjunction with the bones and middle cartilage of the nose might be firmer.

At a little distance from each side of this external process, a cellular and spongy bony substance depends from the cribriform plate. The number and figure of the cells in this irregular process of each side, are very uncertain, and

* Cribriforme, Κοσκινειδὴς, spongiforme, istatum.

* Verruca prædura, septum ossis spongiosi.

† Palfyn, Anat. chir. tr. 4. chap. 15.

and not to be represented in words; only the cells open into each other, and into the cavity of the nose: the uppermost, which are below the aperture of the frontal sinuses, are formed like funnels. The outer surface of these cells is smooth and plain, where this bone assists in composing the orbit; at which place, on each side, it has got the name of *os planum*; on the upper edge of which, a small notch or two may sometimes be observed, which go to the formation of the internal orbitar holes; as was remarked in the description of the frontal bone.

Below the cells of each side, a thin plate is extended inwards, and then bending down, it becomes thick and of a spongy texture. This spongy part is triangular, with a streight upper edge placed horizontally, an anterior one slanting from above, downwards and forwards, and with a pendulous convex one below. The upper and lower edges terminate in a sharp point behind. The side of this pendulous spongy part next to the septum narium is convex, and its external side is concave. These two processes of the ethmoid bone have got th name of *ossa spongiosa*, or *turbinata superiora*, from their substance, figure, and situation.

All the prominences, cavities, and meanders of this ethmoid bone, are covered with a continuation of the membrane of the nostrils, in a recent subject. Its horizontal cribriform plate is lodged between the orbitar processes of the frontal bone, to which it is joined by the ethmoid suture, except at the back part where it is connected with the cuneiform bone, by a suture common to both these bones, though it is generally esteemed part of the sphenoidal. Where the ossa plana are contiguous to the frontal bone within the orbit, their conjunction is reckoned part of the transverse suture. Farther forward than the ossa plana, the cells are covered by the ossa unguis, which are not only contiguous to these cells, but cannot be separated from them, without breaking the bony substance; and therefore, in justice, those bones ought to be demonstrated as part of the ethmoid bone. Below the ossa unguis and plana, these cells and ossa spongiosa are overlopped by the maxillary bones. The cellular part of each palate bone is contiguous to each os planum and cells backwards. The lower edge of the nasal perpendicular plate is received into the furrow of the vomer. Its posterior edge is joined to the fore part of the processus azygos of the sphenoid bone. Its upper edge joins the nasal process of the frontal and nasal bones, and its anterior one is connected to the middle cartilage of the nose.

From all which, the uses of this bone are evident, viz. to sustain the anterior lobes of the brain; to give passage to the olfactory nerves, and attachment to the falx; to enlarge the organ of smelling, by allowing the membrane of the nose a great extent; to straiten the passage of the air through the nose, by leaving only a narrow winding canal, on the sensible membranous sides of which the substances conveyed along with the air must strike; to form part of the orbit of the eyes and septum narium; while all its parts are so light as not to be in hazard of separating by their weight; and they are so thin as to form a large surface, without occupying much space. This brittle substance, however, is sufficiently protected from external injuries by the firm bones which cover it.

If this bone is seized on by any corroding matter, we may easily conceive what destruction may ensue. Hence it is, that an ozaena is difficult to cure; and that, in violent scurvies, or in the lues venerea, the fabrick of the nose, the eyes, and even life itself, are in danger. The situation of the nasal plate may shew us, how dangerous a fracture of the bones of the nose may be, when made by a force applied to their middle fore part of a person in whom this nasal plate is perpendicular.

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The ethmoid bone of ripe children is divided into two by a perpendicular cartilage, which, when offified, is the crifta galli, and nafal plate; but its other parts are offified and complete.

OS SPHENOIDES,* or wedge-like bone, fo called becaufe of its fituation in the middle of the bones of the cranium and face, is of fuch an irregular figure, that I know not any thing to which it may be likened, unlefs, perhaps, it bear fome faint refembance to a bat with its wings extended.

When we view the external furface of the os fphenoides, two or three remarkable proceffes from each fide of it may be obferved, which are all of them again fubdivided. The firft pair is the two large lateral proceffes or wings; the upper part of each of which is called the temporal procefs, becaufe they join with the temporal bones in forming the temples, and the feat for fome fhare of the crotaphite mufcles. That part of the wings which juts out towards the infide, fomewhat lower than the temporal apophyfes, and is fmooth and hallowed, where it makes up part of the orbit, is thence named orbitar proceffes. Behind the edge, feparating thefe two proceffes, there is often a fmall groove, made by a breach of the fuperior maxillary nerve, in its paffage to the temporal mufcle. The loweft and back part of each wing, which runs out fharp to meet the offa petrofa, has been ftyled the fpinous procefs: from near the point of which a fharp pointed procefs is frequently produced downwards, which fome call ftyliform, that affords origin to the ptery-ftaphylinus externus mufcle. From this ftyloid procefs a very fmall groove is extended along the edge of the bone to the hollow at the root of the internal plate of the following proceffes, which forms part of the Euftachian tube.* — The fecond pair of external proceffes of the *cuneiform* bone is the two which ftand out almoft perpendicular to the bafe of the fkull. Each of them has two plates, and a middle foffa facing backwards, and fhould, to carry on our comparifon, be likened to the bat's legs, but are commonly faid to refemble the wings of that creature, and therefore are named *pterygoid* or *aliform* † proceffes. The external plates are broadeft, and the internal are longeft. From each fide of the external plates the pterygoid mufcles take their rife. At the root of each internal plate a fmall hollow may be remarked, where the mufculus ptery-ftaphylinus internus, or circumflexus palati rifes, and fome fhare of the cartilaginous end of the Euftachian tube refts; and, at the lower end of the fame plate, is a hook-like rifing or procefs, round which the tendon of the laft-named mufcle plays, as on a pulley. From the edge of the external plate fome fmall fharp fpikes ftand out; but their number and bulk are uncertain. To thefe another pair may be added, viz. the little triangular thin procefs, which comes from each fide of the body of the fphenoid bone, where the pterygoid proceffes are rifing from it, and are extended over the lower part of the aperture of the finus as far as to join the ethmoid bone, while their body hangs down into the nares.‡ Befides thefe pairs of proceffes, there is a fharp ridge which ftands out from the middle of its bafe. Becaufe it wants a fellow, it may be called *proceffus azygos*. The lower part of this procefs, where it is received into the vomer, is thick, and often not quite perpendicular, but inclining more to one fide than the other. The fore part of this procefs, where it joins the na-

‡ Cuneiforme, πολυμορφον, multiform, paxillum, cribratum palati, colatorii, acvilla, baffiare.

* Winflow, expofition anatomique du corps humain, traite des os fecs, fect. 253.

† Naviculares.

‡ Albin. Tab. off. 5. fig. 2, 6. A.A. Bertin Mem. de l'acad des fciences, 1744. Suc. planche viii. fig. 2, 3, 4, 5, 6.

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ſal plate of the os ethmoides, is thin and ſtreight. Theſe two parts have been deſcribed as two diſtinct proceſſes by ſome.

The depreſſions, ſinuoſities, and foſſæ, on the external ſurface of this ſphenoid bone, may be reckoned up to a great number, viz. two on the temporal apophyſes, where the erotaphite muſcles lodge. Two on the orbitar proceſſes, to make way for the globes of the eyes. Two between the temporal and ſpinous proceſſes, for receiving the temporal bones. Two between the plates of the pterygoid proceſſes, where the muſculi pterygoidei interni, and ptery-ſtaphylini interni, are placed. Two between the pterygoid and orbitar proceſſes, for forming the holes common to this and to the cheek and maxillary bones. Two on the lower ends of the aliform proceſſes, which the palate bones enter into. Two at the roots of the temporal and pterygoid proceſſes, where the largeſt ſhare of the external pterygoid muſcles have their riſe. Two at the ſides of the proceſſus azygos, far forming part of the noſe, &c. &c.

What I deſcribed under the name of *temporal* and *ſpinous proceſſes* on the outſide of the ſkull, are likewiſe ſeen on its inſide, where they are concave, for receiving part of the brain; and commonly three apophyſes on the internal ſurface of the ſphenoid bone are only mentioned. Two riſing broad from the fore-part of its body, become ſmaller as they are extended obliquely backwards. The third ſtanding on a long tranſverſe baſe, near the back-part of the body of this bone, riſes nearly erect, and of an equal breadth, terminating often in a little knob on each ſide. The three are called *clinoid*, from ſome reſemblance which they were thought to have to the ſupporters of a bed. Sometimes one or both the anterior clinoid proceſſes are joined to the ſides of the poſterior one, or the body of the bone itſelf. From the roots of the anterior clinoid proceſſes, the bone is extended on each ſide outwards and forwards, till it ends in a ſharp point, which may have the name of the *tranſverſe ſpinous* proceſſes. Between, but a little farther back than the two anterior clinoid proceſſes, we ſee a protuberance conſiderably ſmaller than the poſterior clinoid proceſs, but of its ſhape. Another proceſs from between the tranſverſe proceſſes, often forces itſelf forwards into the os ethmoides.

Within the ſkull, there are two ſinuoſities in the internal part of each wing of the ſphenoid bone, for receiving the middle part of the brain. One between the tranſverſe ſpinous proceſſes, for lodging the part of the brain where the crura medullæ oblongatæ are. Immediately before the third or middle clinoid proceſs, a ſingle pit generally may be remarked, from which a foſſa goes out on each ſide to the hole through which the optic nerves paſs. The pit is formed by the conjoined optic nerves; and in the foſſæ theſe nerves are lodged, as they run divided within the ſkull. Between that third protuberance and the poſterior clinoid proceſs, the larger pit for the glandula pituitaria may be remarked. This cavity, becauſe of its reſemblance to a Turkiſh ſaddle, is always deſcribed under the name of *ſella Turcica*, or *ephippium*. On the ſides of the poſterior clinoid proceſs, a foſſa may be remarked, that ſtretches upward, then is continued forward along the ſides of the ſella Turcica, near to the anterior clinoid proceſſes, where a pit on each ſide is made.—Theſe foſſæ point out the courſe of the two internal carotid arteries, after they have entered the ſkull. Beſides all theſe, ſeveral other foſſæ may be obſerved, leading to the ſeveral holes, and imprinted by the nerves and blood-veſſels.

The holes on each ſide the os ſphenoides are ſix proper and three common. The firſt is the round one immediately below the anterior clinoid proceſſes, for the paſſage of the optic nerve, and of the branch of the internal

nal carotid artery that is ſent to the eye. The ſecond is the foramen lacerum, or large ſlit between the tranſverſe ſpinous and orbitar proceſſes; the interior end of which ſlit is large, and, as it is extended outwards, it becomes narrower. The outer end of it is formed in the os frontis; and therefore this might be reckoned among the common foramina. Thro' it the third, fourth, the firſt branch of the fifth, and the greater ſhare of the ſixth pair of nerves, and an artery from the internal carotid, go into the orbit. Sometimes a ſmall branch of the external carotid enters near its end, to be diſtributed to the dura mater * and a vein, (ſome call it the *venous duct*, or *Nuck's aquæduct*) returns through it to the cavernous ſinus.

The third hole, ſituated a little below the one juſt now deſcribed, is called *rotundum*, from its ſhape. It allows paſſage to the ſecond branch of the fifth pair of nerves, or ſuperior maxillary nerve, into the bottom of the orbit. The fourth is the foramen ovale, about half an inch behind the round hole. Through it the third branch of the fifth pair, or inferior maxillary nerve, goes out; and ſometimes a vein from the dura mater paſſes out here.† Very near the point of the ſpinous proceſs, is the fifth hole of this bone; it is ſmall and round, for a paſſage to the largeſt artery of the dura mater, which often is accompanied with a vein. The ſixth proper hole ‡ cannot be well ſeen, till the cuneiform bone is ſeparated from all the other bones of the cranium; for one end of it is hid by a ſmall protuberance of the internal plate of the pterygoid proceſs, and by the point of the proceſſus petroſus of the temporal bone. Its canal is extended above the inner plate of the pterygoid proceſs; and where it opens into the cavity of the noſe, it is concealed by the thin laminous part of the palate bone. Through it a conſiderable branch of the ſecond branch of the fifth pair of nerves is reflected. Often in the middle of the ſella Turcica a ſmall hole or two pierce as far as the cellular ſubſtance of the bone; and ſometimes at the ſides of this ſella, one or more ſmall holes penetrate into the ſphenoidal ſinuſes. Theſe obſervations afforded ſome anatomiſts * an argument of weight in their days in defence of Galen,† who aſſerted the deſcent of the pituita that way into the ſinuſes below.

The firſt of the common holes is that unequal fiſſure at the ſide of the ſella Turcica, between the extreme point of the os petroſum and the ſpinous proceſs of the cuneiform bone. This hole appears after the bones are boiled; for in a recent ſubject its back part is covered by a thin bony plate that lies over the internal carotid artery, and farther forward it is filled with a cartilaginous ligament, under which the cartilaginous part of the euſtachian tube is placed; it was by this paſſage that the ancients believed the ſlimy matter was conveyed from the Eumunctory of the brain, the glaudula pituitaria, to the fauces. The ſecond common hole is the large diſcontinuation of the external ſide of the orbit, left between the orbitar proceſſes of of the cuneiform bone, the os maxillare, malæ, and palati. In this large hole the fat for lubricating the globe of the eye and temporal muſcle is lodged, and branches of the ſuperior maxillary nerve, with ſmall arteries from the carotid and veins paſs. The third hole is formed between the baſe of this bone and the root of the orbitar proceſs of the palate bone of each ſide. Through this branch of the external

* Winſlow, Expoſition anatomique du corps humain, traite des arteries, ſect. 60. et de la tete, ſect. 26.

† Ingraſſ. Commentar. in Galen. de oſſib. lib. 1. comment. 8.

‡ Veſal. anat. lib. 1. cap. 12. Euſtach. tab. 46. fig. 13. & 16. Vidus Vidius, anat. lib. 2. cap. 2. explicat. tab. 5. & tab. 5. fig. 8, 9, 10. lit. O.

* Jac. Sylv. Calumniæ ſecundæ amolitio Laurent. Hiſt. anat. lib. 2. queſt. 11.

† Galen. De uſa part. lib. 9. cap. 1.

external carotid artery, and of the second branch of the fifth pair of nerves, are allowed a passage to the nostrils, and a returning vein accompanies them. Sometimes, however, this hole is proper to the palate bone, being entirely formed out of its substance.

Under the sella Turcica, and some way farther forward, but within the substance of the sphenoid bone, are two sinuses, separated by a bony plate. Each of them is lined with a membrane, and opens into the upper and back part of each nostril by a round hole, which is at their upper fore part. This hole is not formed only by the os sphenoides, which has an aperture near as large as any transverse section of the sinus, but also by the palate bones which are applied to the fore part of these sinuses, and close them up, that hole only excepted, which was already mentioned. Frequently the two sinuses are of unequal dimensions, and sometimes there is only one large cavity, with an opening into one nostril. These cavities are likewise said * to be extended sometimes as far back as the great foramen of the occipital bone. In other subjects they are not to be found, when the bone is composed of large cells. † Some ‡ mention a cavity within the partition of the sinuses: but it is small. The sphenoidal sinuses serve the same uses as the frontal do.

As this bone is extremely ragged and unequal, so its substance is of very different thickness, being in some places diaphanous; in others it is of a middle thickness, and its middle back part surpasses the greatest share of the cranium in thickness.

The os sphenoides is joined, by its wings, to the parietal bones above, to the os frontis and ossa malarum before; to the temporal bones behind; by the fore part of its body and spinous processe; to the frontal and ethmoid bones; by its back part, behind the two sinuses, to the occipital, where it looks like a bone with the epiphyses taken off, and, as was formerly observed in the description of the occipital bone, it cannot be separated without violence in adults; to the palate bones, by the ends of the pterygoid processes, and still more by the fore part of the internal plates of the pterygoid processes, and of the sinuses; to the maxillary bones, by the fore-part of the external pterygoid plates; to the vomer and nasal plate of the os ethmoides, by the processus azygos.

All these conjuctions, except the last, which is a schindylesis, are said to be by the suture proper to this bone; though it is at first sight evident, that several other sutures, as the transverse, ethmoidal, &c. are confounded with it.

We see now how this bone is joined to all the bones of the cranium, and to most of the upper jaw; and therefore obtained the name of the wedge-like bone.

The uses are so blended with the description, as to leave nothing new to be added concerning them.

The sphenoidal bone is almost complete in a fœtus of nine months; only the great alæ separate after maceration from the body of the bone. The processus azygos is very large and hollow; the thin triangular processes are not ossified; the internal surface of the body is unequal and porous; the sinuses do not appear.

Whoever is acquainted with each bone of the cranium, can, without difficulty, examine them as they stand united, so as to know the shapes, sizes, distances, &c of their several parts, and the forms, capacities, &c. of the cavities formed by them, which is of great use towards understanding the anatomy of the parts contiguous to, contained within, or connected to them. Such a review is necessary, after considering each class of bones. Thus the orbits, nostrils, mouth, face, head, spine, thorax pelvis, trunk, extremities, and skeleton, ought likewise to be examined.

* Albin. de ossib. § 39. † Vesal. lib. 1. cap. 6. ‡ Id. ibid.

The

The FACE is the irregular pile of bones, composing the fore and under part of the head, which is divided, by authors, into the upper and lower maxillæ, or jaws.

The superior maxilla * is the common designation given to the upper immovable share of the face; though, if we would follow Celsus,† we should apply the word *maxilla* to the lower jaw only, and the name *malla* to this upper jaw. In complaisance to prevailing custom, I shall, however, use the terms as now commonly employed. The shape of the superior jaw cannot easily be expressed; nor is it necessary, provided the shape and situation of all the bones which compose it are described. It is bounded above by the transverse suture, behind by the fore part of the sphenoid bone, and below by the mouth.

The upper jaw consists of six bones on each side, of a thirteenth bone which has no fellow, placed in the middle, and of sixteen teeth. The thirteen bones are two ossa nasi, two ossa unguis, two ossa malarum, two ossa maxillaria, two ossa palati, two ossa spongiosa inferiora, and the vomer.

The ossa nasi are placed at the upper part of the nose; the ossa unguis are at the internal canthi of the orbits; ossa malarum form the prominence of the cheeks; ossa maxillaria form the side of the nose, with the whole lower and fore part of the upper jaw, and the greatest share of the roof of the mouth; ossa palati are situated at the back part of the palate, nostrils, and orbit; ossa spongiosa are seen in the lower part of the nares; and the vomer helps to separate these two cavities.

The bones of the upper jaw are joined to the bones of the skull by the schindylesis and sutures, already described as common to the cranium and face, and they are connected to each other by gomphosis and fifteen sutures.

* Σιαγων, γένυς, mandibula.

† Lib. 8. cap. 1.

The gomphosis only is where the teeth are fixed in their sockets, and the schindylesis is only where the edges of the vomer are joined to other bones.

The sutures are generally distinguished by numbers, which have been differently applied; and therefore I join those * who prefer the giving names to each, which may be easily contrived from their situation, or from the bones which they connect.

The first is the anterior nasal,† which is streight, and placed longitudinally in the middle fore part of the nose.

The second and third are the lateral nasal,‡ which are at each side of the nose, and almost parallel to the first suture.

Each of the two lacrymal is almost semicircular, and is placed round the lacrymal-groove.

The sixth and seventh are the internal orbitar; each of which is extended obliquely from the middle of the lower side of an orbit to the edge of its base.

The two external orbitars are continued, each from the end of the internal orbitar, to the under and fore part of the cheek.

The tenth is the mystachial, which reaches only from the lower part of the septum narium to between the two middle dentes incisores.

The longitudinal palate ‖ suture stretches from the middle of the foremost teeth, through the middle of all the palate.

The transverse palate one § runs across the palate, nearer the back than the fore part of it.

Each of the two palato maxillary is at the back part of the side of each nostril.

The fifteenth is the spinous, which is in the middle of the lower part of

* Vander Linden. Medicin. physiolog. cap. 13. art. 2. sect. 10. Rolfinc. Anat. lib. 2. cap. 25. Schenk. Schol. part. sect. ult. par. 2. cap. 5.

† Nasalis recta.

‡ Nasalis obliqua.

‖ Laquearis, palataria recta.

§ Arcuata, palatina postica.

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the noſtrils. This may perhaps be rather thought a double ſchindyleſis.

The connection of the oſſa ſpongioſa to the ſide of each noſtril, is ſo much by a membrane in young ſubjects, by a ſort of hook, and afterwards by concretion or union of ſubſtance in adults, that I did not know well how to rank it; but if any chuſes to call it a ſuture, the addition of two tranſverſe naſal ſutures may be made to thoſe above-named.

Theſe ſutures of the face (formerly called *harmoniæ*) have not ſuch conſpicuous indentations as thoſe of the ſkull have: the bones here not having ſubſtance enough for forming large indentations, and there being leſs neceſſity for ſecuring againſt external injuries, or any internal protruding force, than in the cranium. Theſe ſutures often diſappear in old people, by the bones running into each other; which can do little prejudice, becauſe the principal uſe of the bones being ſo numerous here, is to allow them to be extended into a proper form.

It is evident, from the manner of the conjunction of theſe bones, that they can have no motion, except in common with the cranium.

The purpoſes which this pile of bones ſerves, will be ſhewn in the deſcription which I am to give of each of them.

OSSA NASI, ſo named from their ſituation at the root of the noſe, are each of an irregular oblong ſquare figure, being broadeſt at their lower end, narroweſt a little higher than their middle, and becoming ſomewhat larger at the top, where they are ragged and thickeſt, and have a curvature forwards, that their connection with the frontal bone might be ſtronger. Theſe bones are convex externally, and thereby better reſiſt any violence from without; and they are concave internally, for enlarging the cavity of the noſe.

The lower edge of theſe bones is unequal, and is ſtretched outwards and backwards, to join the cartilages of the noſtrils. Their anterior ſide is thick, eſpecially above, and unequal, that their conjunction to each other might be ſtronger; and a ſmall riſing may be remarked on their inner edge, where they are ſuſtained by the ſeptum narium. Their poſterior ſide, at its upper half, has externally a depreſſion, where it is over-lopped ſome way by the maxillary bones, while its lower half covers theſe bones; by which contrivance, they do not yield eaſily to preſſure applied to their fore part or ſides.

A ſmall hole is frequently to be obſerved on their external ſurface, into which two, three, or four holes, which appear internally, terminate for the tranſmiſſion of ſmall veins: ſometimes the holes go no farther than the cancelli of the bones.

The naſal bones are firm and ſolid, with very few cells or cancelli in them; the thin ſubſtance of which they conſiſt not requiring much marrow.

They are joined above to the frontal bone, by the middle of the tranſverſe ſuture; behind, to the maxillary bones, by the lateral naſal ſutures; below, to the cartilages of the noſe; before, to one another, by the anterior naſal ſuture; internally, to the ſeptum narium.

Theſe bones ſerve to cover and defend the root of the noſe.

In an infant the naſal bones are proportionally ſhorter, and leſs thick at their upper part, than in an adult, but are otherwiſe complete.

OSSA UNGUIS, or *LACRIMALIA*, are ſo named, becauſe their figure and magnitude are ſomething near to thoſe of a nail of one's finger, and becauſe the tears paſs upon them into the noſe.

Their external ſurface is compoſed of two ſmooth concavities and a middle ridge. The depreſſion behind forms a ſmall ſhare of the orbit for the eye-ball to move on, and the one before is a deep perpendicular canal, or foſſa, larger above than below, containing

taining part of the lacrymal sac and duct. This is the part that ought to be pierced in the great operation for the fistula lacrymalis. This fossa of the bone is cribriform, or has a great number of small holes through it, that the filaments from the membrane which lines it, insinuating themselves into these holes, might prevent a separation of the membrane, and secure the bone in its natural situation. The ridge between these two cavities of the os unguis, is the proper boundary of the orbit at its internal canthus; and beyond which surgeons should not proceed backwards in performing operations here. The internal or posterior surface of this bone consists of a furrow in the middle of two convexities.

The substance of the os unguis is as thin as paper, and very brittle; which is the reason that those bones are often wanting in skeletons, and need little force to pierce them in living subjects.

Each of these bones is joined, above, to the frontal bone, by part of the transverse suture; behind, to the os planum of the ethmoid bone, by the same suture; before, and below, to the maxillary bone, by the lacrymal suture: internally, the ossa unguis cover some of the sinus ethmoidales; nay, are really continuous with the bony lamellæ which make up the sides of these cells; so that they are as much part of the ethmoid bone as the ossa plana.

These unguiform bones compose the anterior internal parts of the orbits, lodge a share of the lacrymal sac and duct, and cover the ethmoid cells. Their situation, and tender substance, make a rash operator in danger of destroying a considerable share of the organ of smelling, when he is performing the operation of the fistula lacrymalis; but when these bones are hurt, they cast off without much difficulty, and consequently the wound is soon cured, unless the patient labours under a general cacoethes, or there is a predisposition in the bones to caries; in which case a large train of bad symptoms follow, or at best the cure proves tedious.

These bones are fully formed in a new-born child.

OSSA MALARUM * was the name given by Celsus, as was already remarked, to all the upper jaw, but is now appropriated to the prominent square bones which form the cheek on each side. Before their surface is convex and smooth; backward, it is equal and concave, for lodging part of the crotaphyte muscles.

The four angles of each of these bones have been reckoned processes by some. The one at the external canthus of the orbit, called the *superior orbitar* process, is the longest and thickest. The second terminates near the middle of the lower edge of the orbit in a sharp point, and is named the *inferior orbitar* process. The third, placed near the lower part of the cheek, and thence called *maxillary*, is the shortest, and nearest to a right angle. The fourth, which is called *zygomatic*, because it is extended backwards to the zygoma of the temporal bone, ends in a point, and has one side streight, and the other sloping. Between the two orbitar angles, there is a concave arch, which makes about a third of the external circumference of the orbit, from which a fifth process is extended backwards within the orbit, to form near one third of that cavity; and hence it may be called the *internal orbitar* process. From the lower edge of each of the ossa malarum, which is between the maxillary and zygomatic processes, the masseter muscle takes its origin; and from the exterior part of the zygomatic process, the musculus distortor oris rises; in both which places the surface of the bone is rough.

On the external surface of each cheek bone, one or more small holes are commonly found, for the transmission of small nerves or blood-vessels

* Jugalia vel zygomatica, hypopia, subocularia.

from

from, and ſometimes into the orbit. On the internal ſurface are the holes for the paſſage of the nutritious veſſels of theſe bones. A notch on the outſide of the internal orbitar proceſs of each of theſe bones, aſſiſts to form the great ſlit common to this bone and to the ſphenoid, maxillary, and palate-bones.

The ſubſtance of theſe bones are, in proportion to their bulk, thick, hard, and ſolid, with ſome cancelli.

Each of the oſſa malarum is joined, by its ſuperior and internal orbitar proceſſes, to the os frontis, and to the orbitar proceſs of the ſphenoid bone, by the tranſverſe ſuture. By the edge between the internal and inferior orbitar proceſſes, to the maxillary bone, by the internal orbitar ſuture. By the ſide between the maxillary and inferior orbitar proceſs, again to the maxillary bone, by the external orbitar ſuture. By the zygomatic proceſs to the os temporum, by the zygomatic ſuture.

The cheek bones are entire, and fully oſſified in all their parts in infants.

OSSA MAXILLARIA SUPERIORA, are the largeſt bones, and conſtitute the far greater part of the upper jaw, which has appropriated the name of *maxillaria* to them. The figure of one of them, or of the two when joined, is ſo irregular, that words can ſcarce give an idea of it.

The proceſſes of each os maxillare, may be reckoned ſeven. The firſt is the long naſal one, at its upper and fore-part, which is broad below, and turns ſmaller as it riſes upwards, to make the ſide of the noſe. At the root of this, a tranſverſe ridge may be obſerved within the noſtrils, which ſupports the fore part of the upper edge of the os ſpongioſum inferius. The ſecond is produced backwards and outwards, from the root of the naſal proceſs, to form the lower ſide of the orbit, and therefore may be called *orbitar*. The edge of this orbitar proceſs, and the ridge of the naſal one, which is continued from it, make a conſiderable portion of the external circumference of the orbit. From the proper orbitar proceſs, a very rough triangular ſurface is extended downwards and outwards, to be connected with the cheek-bone, and therefore may be called the *malar* proceſs, from the loweſt protuberant part of which, ſome ſhare of the maſſeter muſcle takes its riſe. Behind the orbitar proceſs, a large tuberoſity, or bulge of the bone appears, which is eſteemed the fourth proceſs. On the internal part of this, we often meet with a ridge, almoſt of the ſame height with that in the naſal proceſs, which runs tranſverſely, and is covered by a ſimilar ridge of the palate bone, on which the back part of the upper edge of the os ſpongioſum inferius reſts. The convex back part of this turboſity is rough, for the origin of part of the external pterygoid muſcle, * and more internally is ſcabrous, where the palate and ſphenoid bones are joined to it. That ſpongy protuberance † at the lower circumference of this bone, where the ſockets for the teeth are formed, is reckoned the fifth. The ſixth is the horizontal plate, which forms the greateſt part of the baſe of the noſtrils, and roof of the mouth; its upper ſurface, which belongs to the noſtrils, is very ſmooth, but the other below, is arched and rough, for the ſtronger adheſion of the membrane of the mouth, which is ſtretched upon it, and in chewing, ſpeaking, &c. might otherwiſe be liable to be ſeparated. The ſeventh riſes like a ſpine from the inner edge of the laſt, and forms a ſmall part of the partition of the noſtrils.

The depreſſions in each maxillary bone are, 1. A ſinuoſity behind the orbitar proceſs, made by the temporal muſcle. 2. A pit immediately before the ſame proceſs, where the origin of the muſculus elevator labi-

* Albin. de oſſib. ſect. 79.

† Palma.

orum

orum communis, and elevator labii superioris, with a branch of the fifth pair of nerves, are lodged securely. 3. The hollow arch of the palate. 4. The semicircular great notch, or entry to the lower part of the nostrils, betwixt the root of the nasal process, and spine of the palate-plate. Below this, the fore-part of the bone is flatted, or sometimes hollowed by the musculus depressor labii superioris. 5. Sockets for the teeth.† The number of these sockets is uncertain, for the same number of teeth is not in all people, and the four backmost teeth of each side of each jaw, vary greatly in their number of roots; and when the teeth of a living person fall out, or are taken away, the sockets fill up with an osseous network, which becomes solid afterwards. 6. The lacrymal fossa in the nasal process, which assists the os unguis to form a passage for the lacrymal duct. This part of the bone forming this fossa, is so firm and strong, that a surgeon scarce can perforate it with the ordinary instruments for the fistula lacrymalis, and therefore ought to avoid it in doing this operation. Immediately on the outside of this, there is a small depression, from which the inferior, or lesser oblique muscle of the eye, has its origin. ‖ 7. The canal on the upper part of the great tuberosity within the orbit, which is almost a complete hole; in this a branch of the superior maxillary nerve passes. Besides these, the superior surface of the great bulge is concave, to receive the under part of the eye. Immediately above the transverse ridge in the nasal process, a small hollow is formed by the os spongiosum. In some subjects, the nasal process has a small round pit above the lacrymal duct, where the little tendon, or ligament of the orbicular muscle of the eyelids is inserted. It is this tendon, and not the tendon of the larger oblique muscle of the eye, which there is some hazard of cutting in the operation of the fistula lacrymalis.

The holes of this bone are two proper, and two common, which are always to be found, besides several others, whose magnitude, number, &c. are uncertain. The first of the proper is the external orbitar immediately below the orbitar, by which the infra-orbitar branch of the second branch of the fifth pair of nerves, and a small artery, come out after having passed in the canal at the bottom of the orbit, described in number 7, of the depressions. This hole is often double, and that when the nerve has happened to split before it has escaped from the bone. The second is the foramen incisivum, just behind the fore-teeth, which, at its under-part, is one irregular hole, common to both the maxillary bones when they are joined; but as it ascends, soon divides into two, three, or sometimes more holes, some of which open into each nostril. Through them small arteries and veins, and a twig of the second branch of the fifth pair of nerves pass, and make a communication between, or join the lining coats of the nose and mouth. In some subjects, Steno's duct may be traced some way on the side of these passages next to the nose, and small orifices may be observed opening into the mouth.

The first common hole is that which appears at the inner side of the back part of the tuberosity, and of the sockets of the teeth, and is formed by a fossa in this bone, and a corresponding one in the os palati; through it a nerve, which is a branch of the second branch of the fifth pair, runs to the palate. The other common hole is the great slit in the outside of the orbit described already, as the second common hole of the sphenoid bone.

On the nasal process, often holes may be observed for the passage of vessels

† Βόθρια, ὀλμίσκοι, alveoli, fossulæ, mortariola, fræna, locelli, cavæ, prælsepiola, loculamenta.

‖ Winslow, Exposition anatomique des os secs, sect. 276.

veſſels to the ſubſtance of the bones; and, at the back part of each tuberoſity, ſeveral foramina are placed, for the tranſmiſſion of nerves to the cavity within; but theſe are uncertain.

All the body of the maxillary bone is hollow and leaves a large ſinus a-kin to the frontal and ſphenoid, which is commonly, but unjuſtly, called *antrum Highmorianum*.* When the os maxillare is ſingle or ſeparated from all the other bones of a ſkeleton, its antrum appears to have a large aperture into the noſtrils; but in recent ſubjects it is ſo covered at its back part, by the palate bone; in the middle, by the os ſpongioſum inferius; before, by a ſtrong membrane, that one or ſometimes two holes, ſcarce larger than a crow-quill, are only left at the upper part; which, after a ſhort winding progreſs, open into the noſtrils between the two oſſa ſpongioſa: At the bottom of this cavity, we may often obſerve ſome protuberances, in which the ſmall points of the roots of the teeth are contained.† This cavern and the ſockets of the teeth are often divided by the interpoſition only of a very thin bony plate, which is liable to be eroded by acrid matter collected in the antrum, or to be broke in drawing a tooth.‡

The ſymptoms of a collection of matter here, naturally leads us to the practice of pulling out the teeth, and piercing through this plate into the antrum, to procure an evacuation of the collected matter; by which conſiderable ſervice is frequently done. ‖

The maxillary ſinuſes have the ſame uſes as the frontal and ſphenoidal, and the ſituation of the ſinuſes is ſuch, that the liquor drilling from them, from the cells of the ethmoid and palate bones, and from the lacrymal ducts, may always moiſten all the parts of the membrane of the nares in the different ſituations which the head is in.

Though the membranes which line the frontal, ſphenoidal, and maxillary ſinuſes, are continuations of the one which covers the bones within the noſe; yet they are much thinner than it is, and have ſo much ſmaller veſſels, that the injection which makes the membrane of the noſe red all over, fills only ſome few veſſels of the maxillary ſinuſes, and ſcarce is obſerved in the frontal and ſphenoidal. Are not the larger veſſels intended for a more plentiful ſecretion of a viſcid liquor to defend the membrane from the effects of the perflatus, which is conſtantly through the noſe? Are not the membranes which have the ſmalleſt veſſels, cæteris paribus, the moſt ſenſible? Are not many phænomena of ſmelling, inflammations of theſe parts, megrim, polypi, &c. depending on this ſtructure of theſe membranes?

The ſubſtance of the oſſa maxillaria, is compact and firm, except at the inferior proceſſes, in which the teeth are lodged, where it is very ſpongy.

The maxillary bones are joined above by the upper ends of their naſal proceſſes to the os frontis, by the tranſverſe ſuture; at the ſides of theſe proceſſes, to the oſſa unguis, by the lacrymal ſutures; to the naſal bones, by the lateral naſal ſutures; by their orbitar proceſſes to the cheek bones, by the external orbitar ſutures; by the internal ſides of the internal orbitar proceſſes, to the oſſa plana, by part of the ethmoidal ſuture; by the back part of the tuberoſities, to the palate bones, by the ſuturæ palato-maxillares; by the poſterior edges of their palatine lamellæ, to the oſſa palati, by the tranſverſe palate ſuture; by their naſal ſpines to the vomer, by the ſpinus ſuture; by their ſockets, to the teeth by gomphoſis; by the internal edge of the palate-plate, to one another, by the longitudinal palate ſuture; on the upper and fore-part of which a furrow is left for receiving the

* Genæ.

† Highmore, Diſquiſ. anat. lib. 3. part. 2. cap. 1.

‡ Highmore, ibid.

‖ Cowper in Drake's anthropol. book 3. chap. 10. Medical Eſſays and Obſerv. vol. 5. art. 30.

the cartilage which forms the partition of the noſtrils; between the fore part of the noſtrils and mouth, to each other, by the myſtachial ſuture; ſometimes they are connected to the oſſa ſpongioſa inferiora, by a plain concretion or union of ſubſtance.

These bones form the greater part of the noſe and of the roof of the mouth, and a conſiderable ſhare of the orbit. They contain ſixteen teeth, give riſe to muſcles, tranſmiſſion of nerves, &c. as mentioned in the deſcription of their ſeveral parts.

In each of the maxillary bones of a new-born child, the external orbitar proceſs is hollow with remarkable holes in it; there are five ſockets for the teeth, of which the two poſterior are very large, and, when divided by a ſecond croſs partition, make the number of ſockets ſix. * The palate plate is cribriform about the middle. The great tuberoſity is not formed; inſtead of the antrum, there is only an oblong depreſſion at the ſide of the noſtrils. †

OSSA PALATI are commonly deſcribed as two ſmall ſquare bones, at the back part of the palate or roof of the mouth, though they are of much greater extent, being continued up the back part of the noſtrils to the orbit. † Each palate bone may therefore be divided into four parts, the palate ſquare bone, the pterygoid proceſs, naſal lamella, and orbitar proceſs.

The ſquare bone is unequally concave, for enlarging both the mouth and cavity of the noſe. The upper part of its internal edge riſes in a ſpine, after the ſame manner as the palate-plate of the maxillary bone does, to be joined with the vomer. Its anterior edge is unequally ragged, for its firmer connection with the palate-proceſs of the os maxillare. The internal edge is thicker than the reſt, and of an equal ſurface, for its conjunction with its fellow of the other ſide. Behind, this bone is ſomewhat in form of a creſcent, and thick, for the firm connection of the velum pendulum palati; the internal point being produced backwards, to afford origin to the palato-ſtaphylinus or azygos muſcle. This ſquare bone is well diſtinguiſhed from the pterygoid proceſs by a perpendicular foſſa, which, applied to ſuch another in the maxillary bone, forms a paſſage for the palatine branch of the fifth pair of nerves; and by another ſmall hole behind this, through which a twig of the ſame nerve paſſes.

The pterygoid proceſs is ſomewhat triangular, having a broad baſe, and ending ſmaller above. The back part of this proceſs has three foſſæ formed in it; the two lateral receive the ends of the two plates of the ſphenoid bone, that are commonly compared to a bat's wing; the middle foſſa makes up a part of what is commonly called the foſſa pterygoidea; the fore ſide of this palatine pterygoid proceſs is an irregular concave, where it receives the back part of the great tuberoſity of the maxillary bone. Frequently ſeveral ſmall holes may be obſerved in this triangular proceſs, particularly one near the middle of its baſe, which a little above, communicates with the common and proper holes of this bone already taken notice of.

The naſal lamella of this bone, is extremely thin and brittle, and riſes upwards from the upper ſide of the external edge of the ſquare-bone, and from the narrow extremity of the pterygoid proceſs, where it ſo weak, and, at the ſame time, ſo firmly fixed to the maxillary bone, as to be very liable to be broken in ſeparating the bones. From the part where the plate riſes, it runs up broad on the inſide of the tuberoſity of the maxillary bone, to form a conſiderable ſhare

* Albin. Oſtrogen. tab. 5. fig. 45. Ungebav. de dentit. ſecund. jun. ſect. 1.

† Euſtach. tab. 47. fig. 1, 3, 6, 7, 8. Vidus Vidius, de anat. lib. 2. cap. 2. explicat. tab. 6. fig. 10. Winſlow Memoires de l'acad. des ſciences, 1720.

ſhare of the ſides of the maxillary ſinus, and to cloſe up the ſpace between the ſphenoid and the great bulge of the maxillary bone, where there would otherwiſe be a large ſlit opening into the noſtrils.* From the middle-internal ſide of this thin plate, a croſs ridge placed on ſuch another of the maxillary bone is extended; on it, the back part of the os ſpongioſum inferius reſts. Along the outſide of this plate, the perpendicular foſſa made by the palate-nerve is obſervable.

At the upper part of this naſal plate, the palate-bone divides into two proceſſes, which I already named *orbitar*; between which and the ſphenoid bone that hole is formed, which I mentioned as the laſt of the holes common to the ſphenoid bone. Sometimes this hole is wholly formed in the os palati, by a croſs plate going from the one orbitar proceſs to the other. A nerve, artery, and vein, belonging to the noſtrils, paſs here. The anterior of the two orbitar proceſſes is the largeſt, and has its fore part contiguous to the back part of the maxillary ſinus, and its upper ſurface appears in the bottom of the orbit, behind the back part of the os maxillare and planum. It has cells behind reſembling thoſe of the ethmoid bone, to which it is contiguous; it is placed on the aperture of the ſinus ſphenoidalis, ſo as to leave only a round hole at its upper fore part. The other part of the orbitar proceſs is extended along the internal ſide of the upper back part of the maxillary tuberoſity, to the baſe of the ſphenoid bone, between the root of the proceſſus azygos and the pterygoid proceſs.

The palate ſquare part of this palate-bone, and its pterygoid proceſs, are firm and ſtrong, with ſome cancelli; but the naſal plate and orbitar proceſſes are very thin and brittle.

The palate-bones are joined to the maxillary, by the fore edge of the palate ſquare bone, by the tranſverſe palate ſuture: By their thin naſal plates, and part of their orbitar proceſſes, to the ſame bones, by the palato-maxillares ſuture. By their pterygoid proceſſes, and back part of the naſal plates, to the alæ veſpertilionum, by the ſphenoid ſuture. By the tranſverſe ridges of the naſal plates, to the oſſa ſpongioſa inferiora, by contact; hence frequently there is an intimate union of the ſubſtance of theſe bones in old ſkulls. By the orbitar proceſſes, to the oſſa plana and cellulæ ethmoidæ, by the ethmoid ſuture; to the body of the ſphenoid bone, by the ſphenoid ſuture; by the internal edge of the ſquare bones, to each other, by the longitudinal palate ſuture, and by their naſal ſpines, to the vomer, by the ſpinous ſuture.

The palate-bones form part of the palate, noſtrils, orbits, and foſſæ pterygoideæ, and they cover part of the ſinus maxillares, ſphenoidales, and ethmoidei.

Theſe bones are very complete in a new-born infant, the naſal plates being then thicker and ſtronger than in adults; but the orbitar proceſſes have not the cells which appear in the bones of adults.

When we are acquainted with the hiſtory of theſe bones, the reaſon is evident why the eyes are ſo much affected in ulcers of the palate, as to be often attended with blindneſs, which frequently happens in an ill-managed lues venerea; or why, on the other hand, the palate ſuffers from an ægylops.*

OSSA TURBINATA, or ſpongioſa inferiora, reſemble the ſuperior oſſa ſpongioſa in ſhape and ſubſtance, but have their anterior and upper edges contiguous to the tranſverſe ridges of the naſal proceſſes of the maxillary and palate bones. From their upper ſtreight edge, two ſmall proceſſes ſtand out; the poſterior, which is the broadeſt, deſcends to cover ſome of the antrum Highmo-

* Albin. de oſſib. ſect. 88.

* Hoffman. in Ephemerid. German. cent. 1. and 2. obſerv. 135.

rianum

rianum; the anterior rises up to join the os unguis, and to make part of the lacrymal duct.

Below the spongy bones already mentioned, there are sometimes two others, one in each nostril, which seem to be a production of the sides of the maxillary sinus turned downwards.* When this third sort of spongy bones is found, the middle one of the three in each nostril is the largest, and the lowest is the smallest.

Besides all these, there are often several other small bones standing out into the nostrils, that, from their shape, might also deserve the name of *turbinata*, but are uncertain in their bulk, situation, and number.†

The names of these bones sufficiently declare their spongy substance, which has no external plate covering it.

They are joined to the ossa maxillaria palati, and unguis in old subjects, by a firm union of substance; and as this happens also frequently in people of no great age, some ‡ are of opinion, that they should be esteemed part of the palate bones; others ‖ think, that since their upper edge is continued by a plate to a part of the os ethmoides, they ought to be esteemed a part of this bone.

Their use is to straiten the nostrils, to afford a large surface for extending the organ of smelling, to cover part or the antra maxillaria, and to assist in forming the under part of the lacrymal ducts, the orifices of which into the nose are concealed by these bones.

The ossa turbinata are nearly complete in a new-born infant.

VOMER, or bone resembling a plough-share, is the thirteenth of the upper jaw, without a fellow, forming the lower and back parts of the partition of the nose.§

The figure of this bone is an irregular rhomboid. Its sides are flat and smooth. Its posterior edge appears in an oblique direction at the back part of the nostrils. The upper one is firmly united to the base of the sphenoid bone, and to the nasal plate of the ethmoid; and, when it can be got separated, is hollow, for receiving the processus azygos of the sphenoid. The anterior edge has a long furrow in it, where the middle cartilage of the nose enters. The lower edge is firmly united to the nasal spines of the maxillary and palate bones. These edges of this bone are much thicker than its middle, which is as thin as the finest paper; by which, and the firm union or connection this bone has above and below, it can very seldom be separated entire in adults; but, in a child, it is much more easily separated entire, and its structure is more distinctly seen; wherefore I shall examine all the parts of such a subject.

Its situation is not always perpendicular, but often inclined and bended to one side, as well as the nasal plate of the ethmoid bone.

The vomer is convex at its upper part, and then is streight, as it is extended downwards and forwards, where it is composed of two plates; the edges of which have a great number of small processes, disposed somewhat like the teeth of a saw, but more irregularly, and several of them are reflected back. Between these plates a deep fossa is left, which, so far as the top of the curvature, is wide, and has strong sides, for receiving the processus azygos of the sphenoid bone. Beyond the arch forwards, the fossa is narrower and shallower gradually to the point of the bone, receiving for some way the nasal lamella ethmoidea; which, after the ossification is complete, is so closely united to the vomer by the little processes piercing into its substance, as to prevent any separation; on which account it has been esteemed by some * a part of the

* Cowper in Drake's Anthropolog. book 3. chap. 10. † Santorin. observat. anatomic. cap. 5. sect. 9. ‡ Id. ibid. cap. 5. sect. 7. ‖ Hunauld. in Memoires de l'acad. des sciences, 1730. § Columb. de re anat. lib. 1, cap. 8. Fallop. observat. anatom.

* Lieutaud. Essais anatomiques 1. sect. l'os ethmoide.

ethmoid

ethmoid bone. The middle cartilage of the nose fills up what remains of the fossa at its fore part. The posterior edge of the vomer, which appears above the back part of the palate bones, is broader above; but as it descends forwards, becomes thinner, though it is still solid and firm.

The lower edge of this bone, which rests on the nasal spine of the palate and maxillary bones, has a little furrow on each side of a small middle ridge, answering to the spines of the bones of different sides, and the interstice between them. This edge, and the upper one meet in the pointed fore end of this bone.

The body of the vomer has a smooth surface, and solid but thin substance; and towards its sides, where it is thickest, some cancelli may be observed, when the bone is broken.

It is joined above to the sphenoid and ethmoid bones, and to the middle cartilage of the nose by schindylesis; below, to the maxillary and palate bones, by the spinous suture.

The vomer divides the nostrils, enlarges the organ of smelling, by allowing place for expanding the membrane of the nose on its sides, and sustains the palate-plates of the maxillary and palate bones, which otherwise might be in hazard of being pressed into the nostrils; while the vomer is secured from shuffling to one side or other by the double schindylesis, by which it is joined to the bones above and below.

These then are all the bones which compose the upper jaw, except the teeth, which are so much a-kin to those of the lower jaw, that I chuse to make one description serve for both, in which the differences observable in them shall be remarked, after the second part of the face, the lower jaw, is examined; because the structure of the teeth cannot be well understood, until the case in which they are set is explained.

MAXILLA INFERIOR,* the lower jaw, consists only of one moveable bone, and sixteen teeth incased into it.

This bone, which is somewhat of the figure of the Greek letter υ, is situated at the lower part of the face, so as its convex middle part is forwards, and its legs are stretched back. It is commonly divided into the chin, sides, and processes. The chin is the middle fore-part, the extent of which to each side is marked on the external surface by the holes observable there, and internally by the beginning of an oblique ridge. Beyond these the sides appear, and are continued till the bone, by bending upwards, begins to form the processes.

On the fore part of the chin, a transverse ridge appears in the middle, on each side of which the musculi quadrati, or depressores labii inferioris, and the levatores labii inferioris, depress the bone; and below these prints, a small rising may be observed, where the depressores commence.

On the back part of the chin, sometimes three, always two, small protuberances appear in the middle. To the uppermost, when it is seen, the frænum of the tongue is connected. From the middle one, the musculi genioglossii rise; and from the lowest, the geniohyoidei have their origin. Below the last, we see two rough sinuosities formed by the digastric muscles.

At the lower and fore part of the external surface of each side of the lower jaw, a small eminence may be observed, where the depressor labiorum communis rises. Near the upper edge of the side a ridge runs lengthways, to which the under part of the musculus buccinator is connected. Internally, towards the upper edge of each side, another ridge appears, from which the mylohyoidei have their origin, and to which the internal membrane of the gums adheres.

In the upper edge of both chin and sides are a great many deep pits or sockets, for receiving the roots of the teeth. The number and magnitude of these sockets are various, because

* Τόνος, Γνάθος, mandibula, facies.

cause of the different number, as well of the teeth themselves, as of their roots, in different people. These sockets in this lower jaw, as well as in the upper one, are less deep as old age comes on; when freed from the teeth by any means, they are some time after filled up with an osseous net-work, which at last becomes entirely solid, and as smooth as any other part of the bone; so that in a great many old jaws one cannot observe a vestige of the sockets; but then the jaw becomes less, and much narrower.* Hence we may know why the chin and nose of edentulous people are much nearer than before the teeth were lost; while their lips either fall in towards the mouth, or stand prominent forwards. When new teeth are protruded, new sockets are formed.† The lower edge of the chin and sides is smooth and equal, and is commonly called the base of the lower jaw. The ends of the base, where the jaw turns upwards, are called its angles; the external surface of each of which has several inequalities upon it, where the masseter muscle is inserted; as the internal surface also has, where the pterygoideus internus is inserted, and a ligament extended from the styloid process of the temporal bone is fixed.

The processes are two on each side. The anterior sharp thin coronoid ones have the crotaphite muscles inserted into them. The posterior processes or condyles ‡ terminate in an oblong smooth head, supported by a cervix. The heads whose greatest length is transverse, and whose convexity is turned forwards, are tipped with a cartilage, as the articulated parts of all other moved bones are. The fore part of the root and neck of these condyloid processes are a little hollow and rough, where the external pterygoid muscles are inserted.

The holes of the lower jaw are two on each side; one at the root of the processes internally, where a large branch of the third branch of the fifth pair of nerves enters with an artery, and a vein returns. A small sharp process frequently juts out backwards from the edge at the fore part of this hole, to which a ligament extended from the temporal bone is fixed,* which saves the nerve and vessels from being too much pressed by the pterygoid muscles. From the lower side of this hole, either a small superficial canal or a furrow descends, where a branch of the nerve is lodged, in its way to the mylo-thyoideus muscle and sublingual gland.† The other hole is external, at the confines of the chin, where branches of the nerve and vessels come out. The canal betwixt these two holes is formed in the middle of the substance of the bone, and is pierced by a great number of small holes by which the nerves and blood-vessels of the cancelli and teeth pass.

This canal is continued a little farther than the external hole at the chin. On account of the vessels and nerves of the lower jaw, fractures of it may be attended with dangerous symptoms.

The surface of the lower jaw is hard and firm, except at the spongy sockets, where however it is stronger than the upper jaw. Its internal substance is cellular, without any solid partition between the cancelli in its middle. At the base, especially of the chin, where this bone is most exposed to injuries, the solid sides of it are thick, compact, and hard.

The lower jaw generally receives the roots of sixteen teeth into its sockets, by gomphosis; and its condyloid processes, covered with cartilage, are articulated with the temporal bones, in a manner that is not commonly described right; for, as was already mentioned in the description of the temporal bones, not only the fore part of the cavity between the zygomatic auditory, and vaginal processes, but also the adjoining tubercle at the

* Vesal. anat. lib. 1. cap. 10.
† Fallop. Observ. anat.
‡ Articulatorii.

* Weitbrecht. Syndesmolog. fig. 32. 1.
† Palfyn. anat. chirur. traite 5. chap. 6.

root

root of the zygomatic process of each os temporum is covered with a smooth cartilage, for this articulation. Here also an intermediate moveable cartilage is placed, which being thin in the middle, and thick at the edges, is concave on both sides; and is connected so firmly by ligaments to each condyle, as to follow the motions of the condyle; and so loosely to the temporal bone, as readily to change its situation from the cavity to the tubercle, and to return again; while the common ligament of the articulation affords space enough for such a change of place backwards and forwards; but like other ligaments of the joints by ginglimus, is strong and short at the sides, to confine the lateral motions.

When therefore the teeth of both jaws coincide, the condyles are lodged securely in the temporal cavities, but their motions to either side must be confined both by the firmness of the ligaments, and the rising brims which are on each side of the cavities.

When the jaw is brought directly forwards, the condyle and intermediate cartilages descend and advance forwards upon the tubercles. In this situation the lateral motions are a little more free than in the former one, from the want of rising brims to stop the condyles. When the foreteeth of the lower jaw are moved forwards, and to a side, the condyle of the opposite side is either advanced from the cavity to the tubercle, while the condyle of the same side remains in the cavity; or if both condyles are on the tubercles, when the jaw is moved obliquely to a side, the condyle of the side to which the motion is made, slides back from the tubercle to the cavity. When the mouth is opened by the descent of the lower jaw, the fore part of it, where the depressing muscles are fixed, is drawn backwards, as well as downwards, while resistance is made to the angles moving backwards by the masseter and internal pterygoid muscles, and at the same time, the external pterygoid draw the condyles and their moveable cartilages forwards; and therefore, when the mouth is opened, the condyles are carried forwards upon the tubercles, and the axis of motion of the bone is a little above its angles. But in this situation there is less resistance, than in any other, to the condyles luxating forwards; a disease which seldom happens, except when people are gaping too wide; and therefore the common practice of nurses, who support the jaw of infants when they are yawning, is reasonable. In chewing there is a succession of the motions above described *

Here a general remark may be made, that where-ever moveable cartilages are found in joints, either the articulated bones are of such a figure, or so joined and fixed by their ligaments, that little motion would be allowed without such cartilages; or else some motions are necessary to the right use of the member, which the form of the articulation would not otherwise admit of. This will more fully appear after the other joints with such cartilages are described.

In a child born to the full time, the lower jaw is composed of two bones, connected by a thin cartilage in the middle of the chin, which gradually ossifies, and the two bones intimately unite. In each of these bones there are five or six sockets for teeth as in the upper jaw.

After I have thus described the incasement of the teeth, the insertion of so many muscles of the tongue, and of the os hyoides, the connection of the membrane of the tongue to the maxillary bone, and the motions of this bone; it is easy to see, that the lower jaw must be a principal instrument in manducation, deglutition, and speech.

The teeth are the hard white bodies placed in the sockets of both

* For a more full account of this articulation, vid. Edinburg Medical essays and obs. vol. 1. art. 11. and vol. 3. art. 13. Memoires de l'acad. des sciences, 1744.

jaws,

jaws. Their number is generally sixteen above, and as many below; though some people have more, others have fewer.

The broad thick part of each tooth which appears without the socket, is the base or body.* The smaller processes sunk into the maxillæ, are the roots or fangs, which become gradually smaller towards the end farthest from the base, or are nearly conical, by which the surface of their sides divides the pressure made on the bases, to prevent the soft parts, which are at the small points of the sockets, to be hurt by such pressure. At the place where the base ends, and the roots begin, there is generally a small circular depression, which some call the *neck* or *collar*.

Without the gums the teeth are covered with no membrane, and they are said to have no proper periosteum within the sockets; but that is supplied by the reflected membrane of the gums; which, after a good injection, may be evidently seen in a young subject, with the vessels from it penetrating into the substance of the teeth; and it may be discovered in any tooth recently pulled, by macerating it in water.† The adhesion of this membrane to these roots is strengthened by the small furrows observable on them.

Each tooth is composed of its cortex, or enamel, and an internal bony substance. The cortex has no cavity or place for marrow; and is so solid or hard, that saws or files can with difficulty make impression on it. It is thickest upon the base, and gradually, as the roots turn smaller, becomes thinner, but not proportionally to the difference of the size of the base and roots. The fibres of this enamel are all perpendicular to the internal substance, and are streight on the base, but at the sides are arched with a convex part towards the roots;‡ which makes the teeth resist the compression of any hard body between the jaws, with less danger of breaking these fibres, than if they had been situated transversely. The spongy sockets in which the teeth are placed likewise serve better to prevent such an injury, than a more solid base would have done. Notwithstanding the great hardness of this cortex it is wasted by manducation. Hence the sharp edges of some teeth are blunted, and made broad, while the rough surfaces of others are made smooth and flat, as people advance in life.

The bony part of the teeth has its fibres running streight, according to the length of the teeth. When it is exposed to the air, by the breaking or falling off of the hard cortex, it soon corrupts. And thence carious teeth are all hollow within, when a very small hole appears only externally.

The teeth have canals formed in their middle, wherein their nerves and blood-vessels are lodged; which they certainly need, being constantly wasted by the attrition they are subjected to in manducation, and for their farther growth, not only after they first appear, but even in adults; as is evident when a tooth is taken out; for then the opposite one becomes longer, and those on each side of the empty socket turn broader; so that when the jaws are brought together, it is scarce observable where the tooth is wanting.*

The vessels are easily traced so long as they are in the large canal, but can scarce be observed in their distribution from that to the substance of the teeth of adults. Ruysch,† however, affirms, that after injection he could trace the arteries into the hardest part of the teeth; and Leewenhock‡ suspected the fibres of the cortex to be vessels. In children I have frequently injected the vessels of the teeth as far as their base: and in such as are not entirely

* Corona.

† Cowper. Anatom. explicat. tab. 92. fig. 7. lit. E.

‡ Havers Osteolog. nov. disc. 1.

* Ingras. de tumor. cap. 1. p. 24. 25. 26.

† Thesaur. 10. num. 27.

‡ Arcan. natur. continuat. epist. p. 3.

entirely ossified, one can with a lucky injection fill so many vessels, as to make both the outside and inside of the cortical part appear perfectly red. This plentiful supply of vessels must expose the teeth to the same disorders that attack other vascular parts; and such teeth as have the greatest number of vessels, must have the most numerous chances of being seized with these diseases,

Every root of each tooth has such a distinct canal, with vessels and nerves in it. These canals in the teeth with more than one root, come nearer each other, as they approach the base of the tooth; and at last are separated by very thin plates, which being generally incomplete, allow a communication of all the canals; and frequently one common cavity only appears within the base, in which a pulpy substance composed of nerves and vessels is lodged. The condition therefore of the nerves here bears a strong analogy to that of the cutaneous nerves which serve for the sensation of touching.

The entry of the canals for these vessels is a small hole placed a little to a side of the extreme point of each root; sometimes, especially in old people, this hole is entirely closed up, and consequently the nerves and blood-vessels are destroyed.*

The teeth are seen for a considerable time in form of mucus contained in a membrane, afterwards a thin cortical plate, and some few osseous layers appear within the membrane, with a large cavity filled with mucus in the middle; and gradually this exterior shell turns thicker, the cavity decreases, the quantity of mucus is lessened, and this induration proceeds till all the body is formed; from which the roots are afterwards produced.

In young subjects, different stamina or rudiments of teeth are to be observed. Those next the gums hinder ordinarily the deeper seated ones from making their way out, while these prevent the former from sending out roots, or from entering deep into the bony sockets of the jaws; by which they come to be less fixed.

Children are seldom born with teeth; but at two years of age they have twenty; and their number does not increase till they are about seven years old, when the teeth that first made their way through the gums are thrust out by others that have been formed deeper in the jaw, and some more of the teeth begin to discover themselves farther back in the mouth. About fourteen years of age, some more of the first crop are shed, and the number is increased. This shedding of the teeth is of good use; for if the first had remained, they would have stood at a great distance one from another; because the teeth are too hard in their outer crust, to increase so fast as the jaws do. Whereas both the second layer, and the teeth that come out late, meeting, while they are soft, with a considerable resistance to their growth in length, from those situated upon them, necessarily come out broad, and fit to make that close guard to the mouth,* which they now form.

The teeth are joined to the sockets by gomphosis, and the gums contribute to fix them there; as is evident by the teeth falling out when the gums are any way destroyed, or made too spongy, as in the scurvy or salivations; whence some † class this articulation with the syssarcosis.

The uses of the teeth are to masticate our aliment, and to assist us in the pronunciation of several letters.

Though the teeth so far agree in their structure, yet, because of some things wherein they differ, they are generally divided into three classes, viz. incisores, canini, and molares.

The incisores ‡ are the four foreteeth in each jaw, receiving their

* De la Hire Histoire de l'acad. des sciences, 1699.

* Φραγμος.

† Drake's Anthropolog. book 4. chap. 3.

‡ Γελασῖνοι, τομικοι, διχασῆρες, κλῖνες, τομεῖς, προσωσθιοί, ὀξεῖς, risorii, quaterii, primi, primores, anteriores, acuti.

name

name from their office of cutting our aliment; for which they are excellently adapted; being each formed into a sharp cutting edge at their base, by their fore side turning inwards there, while they are sloped down and hollowed behind;* so that they have the form of wedges; and therefore their power of acting must be considerably increased. Seeing in the action of the incisores, a perpendicular compression is only necessary, without any lateral motion, they are not so firmly fixed in their sockets as the other teeth are, each having only one short root, but that is broader from before backwards, than to either side, to have the greatest strength where it is exposed to the strongest force applied to it.†

The incisores of the upper jaw, especially the two middle ones,‡ are broader and longer generally than those of the under jaw.

In a new-born infant, the outer shell of the body of these teeth is only hardened. Afterwards, when the stamina of two sets are formed, each has its own socket, those nearest to the edge of the gums being placed more forward, and the others are lodged farther back within the jaw-bones.

Canini,‖ from the resemblance to dogs tusks, are one on each side of the incisores in each jaw. The two in the upper jaw are called *eye-teeth*, from the communication of nerves which is said to be betwixt them and the eyes. The two in the lower jaw are named *angular* or *wike-teeth*, because they support the angles of the mouth.

The canini are broader, longer, and stronger, than the incisores. Their bases are formed into a sharp edge, as the incisores are; only that the edge rises into a point in the middle. Each of them has generally but one long root, though sometimes they have two.* The roots are crooked towards the end. The canini of the upper jaw are larger, longer, and with more crooked roots, than those of the under jaw. The form of their base is fit both for piercing and cutting, and the long crooked root of each makes it secure in the socket.

The canini of a child are in much the same condition as the incisores are.

The dentes molares, or grinders,† which have got their name because they grind our food, are generally five in each side of each jaw; in all twenty. Their bases are broader, more scabrous, and with a thinner cortical substance, than the other teeth. They have also more roots, and as these roots generally divaricate from each other, the partitions of the sockets between them bear a large share of the great pressure they suffer, and hinder it to act on their points.‡

The base of the first grinder has an edge pointed in the middle, on its outside, resembling the canini; from which it slopes inwards till it rises again into a point. It has generally but one root, which sometimes is long and crooked at its point.

The second dens molaris has two points on its base, rising near equally on its out and inside. It has two roots, either separate or run together, but shorter than the root of the first. These two anterior grinders are much smaller than the three that are placed farther back in the mouth.

The third and fourth are very broad in their bases, with four or five points standing out; and they have three or more roots.

The fifth, called commonly *dens sapientiæ*,‖ from its coming through the gums later than the other grinders, has four points on its base, which is

* Ὀλμίσκος.

† Lettre sur l'osteologie, ascribed to Du Verney.

‡ Duales.

‖ Κυνόδοντες, risorii, fractorii, collaterales, collumellares.

* Fauchard, Chirurgien dentiste, chap. 1.

† Μυλιται, γόμφοι, μύλοι, πλατεῖς, φρασσῆρες, maxillares, mensales, clavales, buccarum.

‡ Lettre sur l'osteologie.

‖ Σωφρονιστῆρες, κραντῆρες ὀψίγονοι, sensus, intellectus, serotini, ætatem complentes, genuini, moderatores.

not

not so large as the base of the third and fourth, and its roots are less numerous.

The incisores of the upper jaw, being broader than those of the lower jaw, make the superior grinders to be placed so much farther back than the lower ones, that when they are brought together, by shutting the mouth, the points of the grinders of the one jaw enter into the depressions of the opposite grinders, and they are all equally applied to each other, notwithstanding the inequality of their surface.

The numerous roots of the dentes molares prevent their loosening by the lateral pressure they suffer in grinding; and as the sockets in the upper jaw are more spongy, and the teeth are more liable, by their situation, to fall out,* the grinders there have more numerous and more separated roots than in the lower jaw.† The number however of the roots of the teeth of both jaws is very uncertain; sometimes they are more, sometimes fewer; frequently several roots are joined together; at other times they are all distinct. The disposition of such as are distinct is also various; for in some the roots stand out streight, in others they separate, and in others again they are crooked inwards. When the roots are united, we can still distinguish them, by remarking the number of small holes at their points, which determine the number of roots each tooth ought to be reckoned to have.

At the time of birth, only two dentes molares in each jaw have begun to ossify, and that at little more than the base, which has several sharp points standing out from it. The temporaneous grinders are placed more directly upon the internal set than the other two classes are; sometimes there is a piece of the bone of the jaws between the two sets; in other children, the two sets have no bone interposed between them.

From what has been said, the answers to the following queries may be given.

Why are children subject to salivation, fever, convulsion, vomiting, purging, &c. when their teeth are breeding or cutting the gums?

Why in children do the dentes incisores first cut the gums, the canini next, and molares last?

Why do children shed their teeth?

Why have these first teeth sometimes roots, and that more frequently in teeth pulled by art than in those which are shed by nature?*

Why do these roots frequently come outwards through the gums?

Whence come butter or buck teeth?

How do these teeth sometimes go into the natural row with the others, after pulling a rotten tooth near them?

How have some people got two rows of teeth in one or both jaws?†

Why do the teeth of old people loosen, and then drop out entire?

Whence arise the new sets of teeth which several old people obtain?‡

Why are not the gums of toothless old people torn by the hard sockets in chewing?

Why are the teeth insensible when slightly filed or rasped?

How come they to be sensible of heat or cold, to be set on edge by acids, or to give an uneasy sensation when gritty or sandy substances are rubbed between them?

Why does a person who has a pained tooth imagine it longer than any other?

What is the reason of some persons dying convulsed, upon rasping or filing down an over-grown tooth?‖

How do the teeth break and moulder away without any pain in some people and not in others?

What parts are affected in the tooth-ach?

* Galen. de offib. cap. 5.

† Fauchard. Chirurg. dent. chap. 1.

* Fauchard. Chirurgien dentiste, p. 7.

† Blas. comment. ad Vesling. Syntagm. cap. 1. 3.

‡ Hoffman. in Van. Horn microcosm. p. 38.

‖ Bartholin. anat. reformat. lib. 4. cap. 12.

What are the causes of the toothach?

May worms be reckoned among these causes? *

Why are the dentes molares most subject to that disease?

In what different manners ought the several classes of teeth to be extracted when such an operation is necessary?

Whence proceed the violent obstinate hemorrhagæ which sometimes attends the drawing of teeth? †

Why is it more difficult and dangerous to draw the eye-teeth than any other?

What makes it impossible frequently to draw grinders without bringing away part of the jaw-bone with them, or breaking the fangs?

Why do teeth soon replaced after being extracted, become again fixed in the sockets? ‡

According to the division made of the skeleton, we should now proceed to the description of the trunk of the body. But must first consider a bone, which cannot well be said to belong to either the head or the trunk; nor is it immediately joined to any other, and therefore is very seldom preserved with skeletons. However, it is generally described by authors after the bones of the face. In obedience therefore to the prevailing method, I shall next examine the structure of

The *OS HYOIDES*,‖ which is situated horizontally between the root of the tongue and the larynx. It is properly enough named hyoides, from the resemblance it bears to the Greek letter υ, and may, for a clearer demonstration of its structure, be distinguished into its body, cornua, and appendices.

The body is the middle broad part, convex before, and hollow behind. The convex fore part is divided into two, by a ridge, into the middle of which the mylo-hyoidei, and into the sides the stylo-hyoidei muscles are inserted. Above the ridge, the bone is horizontal, but pitted in the middle by the insertion of the two genio-hyoidei muscles, and a little hollowed more laterally by the basioglossi. Below the ridge, it is convex, but a little flatted in the middle by the sterno-hyoidei, and pitted more externally by the coraco-hyoidei.

The concavity behind, faces backwards and downwards to receive the thyroid cartilage, when the larynx and the os hyoides are pulled towards each other by the action of the sterno-hyoidei and hyothyroidei muscles; and to its upper edge, the ligamentous membranes of the epiglottis, tongue, and thyroid cartilage, are fixed.

The cornua of the * os hyoides are stretched backwards from each side of its body, where often a small furrow points out the former separation; for in young subjects, the body and cornua are not one continued substance, as they come afterwards to be in adults. These cornua are not always streight, nor of equal length; their two plain surfaces stand obliquely sloping from above outwards and downwards. Into the external, the cerato glossus is inserted above, and the thyro-hyoideus muscle below; and to the one behind, the ligamentous membrane of the tongue and larynx adheres. Each of the cornua becomes gradually smaller, as it is extended from the base; but ends in a round tubercle, from which a moveable cartilage stands out, which is connected to the upper process of the cartilago thyroidea.

Where the body of the os hyoides joins on each side with its cornua, a

* Jacob. in Act. Hafn. vol. 5. obs. 107. Pechlin. Observ. medic. lib. 2. obs. 36. Bartholin. Hist. medic. cent. 3. hist. 96.

† Pare livre 6. chap. 2. Rolfinc. lib. 2. cap. 27 et 30. Moebii Fundam. medicin. cap. 9. Ephemerid. German. dec. 1. ann. 3. obs. 319. Fauch. Chirurg. dentiste, tom. 1. chap. 25. observ. 7.

‡ De la Motte Chirurgie, tom. 1. chap. 4. observ. 2. Fauchard, Chirurgien dentiste, tom. 1. chap. 29.

‖ Hypsyloides Lambdoides, παραγάτη, φαρυγγεσον. os gutturis, os linguæ, os morsus Adami, affesser, os laude, bicorne

* Crura, latera inferiora.

small

ſmall ſtyliform proceſs, called *appendix*,* riſes upwards and backwards, into which the muſculi ſtylo-hyoidei alteri, and part of the hyo-gloſſi muſcles are fixed. From each of them a ligament is ſometimes extended to the ſtyloid proceſſes of the temporal bones, to keep the os hyoides from being drawn too much forwards or downwards. The part of this ligament next to theſe proceſſes ſometimes forms into ſeveral cartilages, which afterwards oſſify in old people.

Ruyſch † ſays that he has ſeen this oſſification continued as far up as the ſtyloid proceſſes, which were therefore joined to the os hyoides by anchyloſis.

The ſubſtance of the os hyoides is cellular, but covered with a firm external plate, which is of ſufficient ſtrength to bear the actions of ſo many muſcles as are inſerted into it.

It is not articulated with any bone of the body, except by means of the muſcles and ligaments mentioned.

The uſe of the os hyoides, is to ſerve as a ſolid lever for the muſcles to act with, in raiſing or depreſſing the tongue and larynx, or in enlargeing and diminiſhing the capacity of the fauces.

At birth, this bone is in a cartilaginous ſtate; excepting a ſmall point of bone in the middle of its body, and in each of the cornua. The appendices frequently remain cartilaginous many years.

OF THE TRUNK.

THE *TRUNK* conſiſts of the ſpine, pelvis, and thorax.

The *SPINE* ‡ is the long pile of bones extended from the condyles of the occiput to the end of the rump. It ſomewhat reſembles two unequal pyramids joined in a common baſe. It is not, however, ſtreight; for its upper part being drawn backwards by ſtrong muſcles, it gradually advances forwards, to ſupport the œſophagus, veſſels of the head, &c. Then it turns backwards, to make place enough for the heart and lungs. It is next bended forwards, to ſupport the viſcera of the abdomen. It afterwards turns backwards, for the enlargement of the pelvis. And laſtly, it is reflected forwards, for ſuſtaining the lowe.t great gut.

The ſpine is commonly divided into true and falſe vertebræ; the former conſtituting the long upper pyramid, which has its baſe below, while the falſe vertebræ make the ſhorter lower pyramid, whoſe baſe is above.

The *TRUE VERTEBRÆ* * are the twenty-four upper bones of the ſpine, on which the ſeveral motions of the trunk of our bodies are performed; from which uſe they have juſtly got their name.

Each of theſe vertebræ is compoſed of its body and proceſſes.

The body is the thick ſpongy forepart, which is convex before, concave backwards, horizontal and plain in moſt of them above and below. Numerous ſmall holes, eſpecially on the fore and back part of their ſurface, give paſſage to their veſſels, and allow the ligaments to enter their ſubſtance. The edges of the body of each vertebra are covered, eſpecially at the fore-part, with a ring of bone firmer and more ſolid than the ſubſtance of the body any where elſe. Theſe rings ſeem to be joined to the vertebræ in the form of epiphyſes, but are alledged by ſome † to be the ligaments oſſified. They are of great uſe in preventing the ſpongy bodies from being broken in the motions of the trunk.

Between the bodies of each two adjoining vertebræ, a ſubſtance between the

* Crura ſuperiora, latera ſuperiora, oſſa granitormia. † Adverſ. anat. dec. 3. ſect. 9.

‡ Ῥάχις, νῶτον ἀκανθα, ἱερα Οὐριγξ, Ὀφλην, tergum, hominis carina.

* Σπονδυλοι, σφονδυλοι, ſpondyli, oſſa orbiculata, oſſa vertebrata, verticula.

† Fallop. Obſervat. anatom.

the nature of ligament and cartilage is interposed; which seems to consist of concentrical curve fibres, when it is cut horizontally; but when it is divided perpendicularly, the fibres appear oblique, and decussating each other.* The outer part of the inter-vertebral ligaments is the most solid and hard; and they gradually become softer till they are almost in the form of a glairy liquor in the centre; and therefore these substances were not improperly called *mucous ligaments* by the ancients.† The external fibrous part of each is capable of being greatly extended, and of being compressed into a very small space, while the middle fluid part is incompressible, or nearly so; and the parts of this ligament between the circumference and centre approach in their properties to either, in proportion to their more solid or more fluid texture. The middle point is therefore a fulcrum, or pivot, on which the motion of a ball and socket may be made, with such a gradual yielding of the substance of the ligament, in which-ever direction our spines are moved, as saves the body from violent shocks, and their dangerous consequences.‡ This ligamento cartilaginous substance is firmly fixed to the horizontal surfaces of the bodies of the vertebræ, to connect them, in which it is assisted by a strong membranous ligament, which lines all their concave surface, and by a still stronger ligament that covers all their anterior convex surface.

We may lay it down as a general rule, notwithstanding some exceptions, that the bodies of the vertebræ are smaller, and more solid above, but as they descend, they appear larger and more spongy; and that the cartilages between them are thick, and the surrounding ligaments strong, in proportion to the largeness of the vertebræ, and to the quantity of motion they perform; by which disposition, the greater weight is supported on the broadest best-secured base, and the middle of our body is allowed a large and secure motion.

From each side of the body of each vertebra, a bony bridge is produced backwards, and to a side; from the posterior end of which, one slanting process rises and another descends; the smooth, and what is generally the flattest side of each of these four processes, which are called the *oblique*,* is covered with a smooth cartilage; and the two lower ones of each vertebra are fitted to, and articulated with, the two upper or ascending oblique processes of the vertebra below, having their articular ligaments fixed into the rough line round their edges.

From between the oblique processes of each side, the vertebra is stretched out laterally into a process that is named *transverse*.

From the back part of the roots of the two oblique, and of the transverse process of each side, a broad oblique bony plate is extended backwards; where these meet, the seventh process of the vertebræ takes its rise, and stands out backwards; this being generally sharp pointed and narrow edged, has therefore been called *spinal* process; from which this whole chain of bones has got its name.

Besides the common ligament which lines all the internal surface of the spinal processes, as well as of the bodies, there are particular ligaments that connect the bony bridges and processes of the contiguous vertebræ together.

The substance of the processes is considerably stronger and firmer, and has a thicker external plate than the bodies of the vertebræ have.

The seven processes form a cavity at their fore part, which, joined to the one at the back part of the bodies, makes a great hole, and the holes of all the vertebræ form a long large con-

duit,

* Blanchard, Anat. reform. cap. 31. Weitbrecht, Syndesmolog. sect. 4, 15.

† Galen, de usu, part. lib. 12. cap. 16.

‡ Medical essays and observ. vol. 5. art. 28.

* Articulatorii, minimi.

duit,* for containing the ſpinal marrow.

In the upper and lower edge of each lateral bridge, there is a notch. Theſe are ſo adapted to each other in the contiguous vertebræ, as to form a round hole in each ſide between each two vertebræ, through which the nerves that proceed from the ſpinal marrow and its blood veſſels paſs.

The articulations then of theſe true vertebræ are plainly double; for their bodies are joined by the intervening cartilage above deſcribed, and their oblique proceſſes being tipped with cartilages, are ſo connected by their ligaments, as to allow a ſmall degree of motion to all ſides. Hence it is evident, that their centre of motion is altered in different poſitions of the trunk; for when we bow forwards, the upper moved part bears entirely on the bodies of the vertebræ; if we bend back, the oblique proceſſes ſupport the weight; if we recline to one ſide we reſt on the oblique proceſſes of that ſide and part of the bodies; if we ſtand erect, all the bodies and oblique proceſſes have their ſhare in our ſupport.

Hence it follows, 1. That becauſe the joints of which the ſpine is compoſed are ſo numerous, the ſpinal marrow, nerves, blood-veſſels, &c. are not liable to ſuch compreſſion and over-ſtretching in the motion of the trunk of the body, as they would otherwiſe be, ſince ſeveral vertebræ muſt be concerned in every motion of the ſpine; and therefore a very ſmall curvature is made at the conjunction of any two vertebræ.† 2. That an erect poſture is the ſureſt and firmeſt, becauſe the ſurface of contact of the fulcra is largeſt, and the weight is moſt perpendicular to them.‡ 3. That the muſcles which move the ſpine act with greater force in bringing the trunk to an erect poſture, than in drawing it to any other; for in bending forwards, backwards, or to a ſide, the muſcles which perform any of theſe actions are nearer the centre of motion; conſequently the lever with which they act is ſhorter than when the centre of motion is on the part of the vertebræ, oppoſite to that where theſe muſcles are inſerted; which is the caſe in raiſing the trunk. This is extremely neceſſary, ſince in the deflections of the ſpine from the perpendicular bearing, the weight of the body ſoon inclines it which way we deſign; whereas, in raiſing us erect, this great weight muſt be more than counteracted. 4. In calculating the force exerted by the muſcles which move the ſpine, we ſhould always make allowance for the action of the cartilages between the vertebræ, which, in every motion from an erect poſture, muſt be ſtretched on one ſide, and compreſſed on the other, to both which they reſiſt; whereas, in raiſing the trunk, theſe cartilages aſſiſt by their ſpringy force.* 5. We are hence naturally led into the reaſon of our height of ſtature increaſing in the morning, and diminiſhing at night;† for the intermediate cartilages of the vertebræ being preſſed all day long by the weight of our body, become more compact and thin in the evening; but when they are relieved from this preſſure in the night, they again expand themſelves to their former thickneſs; and ſeeing the bulk of any part muſt vary according to the different diſtenſion or repletion of the veſſels compoſing it, we may underſtand how we become taller after a plentiful meal, and decreaſe after faſting or evacuations.‡ 6. From the different articulations of the bodies, and oblique proceſſes of the vertebræ, and the different ſtrength of the ligaments, it is plain, that they are formed ſo as to allow much larger motion forwards than backwards; this laſt being of much leſs uſe, and might be danger-

* Ιερα Συριγξ, Σωλήν. Canalis.

† Galen de uſa part. lib. 12. cap. 2.

‡ Paaw de oſſib. par. 2. cap. 2.

* Borelli, de motu animal. pars. 1. ſchol. ad propoſ. 58. Parent. Hiſtoire de l'acad. des ſciences, 1702.

† Waſſe Philoſoph. tranſact. numb. 383, art. 1.

‡ Abbe Fontenu Hiſtoire de l'acad. des ſciences, 1725.

ous,

ous, by over-ſtretching the large blood-veſſels that are contiguous to the bodies of the vertebræ.* 7. The intervertebral cartilages ſhrivelling as they become more ſolid by age, is the cauſe why old people bow forwards, and cannot raiſe their bodies to ſuch an erect poſture as they had in their youth.

The true vertebræ ſerve to give us an erect poſture; to allow ſufficient and ſecure motion to the head, neck, and trunk of the body, and to ſupport and defend the bowels, and other ſoft parts.

At the ordinary time of birth, each vertebra conſiſts of three bony pieces, connected by cartilages; to wit, the body, which is not fully oſſified, and a long crooked bone on each ſide; on which we ſee a ſmall ſhare of the bony bridge, the oblique proceſſes complete, the beginning tranſverſe proceſſes, and the oblique plate, but no ſpinal proceſſes; ſo that the teguments are in no danger of being hurt by the ſharp ends of theſe ſpinal proceſſes, while a child is in its bended poſture in the womb, nor while it is ſqueezed in the birth.

From this general mechaniſm of the ſpine, an account is eaſily deduced of all the different preternatural curvatures which the ſpine is capable of; for if one or more vertebræ, or their cartilages, are of unequal thickneſs in oppoſite ſides, the ſpine muſt be reclined over to the thinner ſide; which now ſuſtaining the greateſt ſhare of the weight, muſt ſtill be more compreſſed, conſequently hindered from extending itſelf in proportion to the other ſide, which, being too much freed of its burden, has liberty to enjoy a luxuriant growth. The cauſes on which ſuch an inequality of thickneſs in different ſides of the vertebræ depends, may vary; for either it may be owing to an over-diſtenſion of the veſſels of one ſide, and from thence a preternatural increaſe of the thickneſs of that part; or, which more commonly is the caſe, it may proceed from an obſtruction of the veſſels, by which the application of proper nouriſhment to the bony ſubſtance is hindered, whether that obſtruction depends on the faulty diſpoſition of the veſſels or fluids; or if it is produced by an unequal mechanical preſſure, occaſioned by a paralytic weakneſs of the muſcles and ligaments, or by a ſpaſmodic over-action of the muſcles on any part of the ſpine, or by people continuing long, or putting themſelves frequently into any poſture declining from the erect one; in all theſe caſes one common effect follows, to wit, the vertebræ, or their cartilages, or both, turn thick on that ſide where the veſſels are free, and remain thin on the other ſide where the veſſels are ſtraitened or obſtructed. Whenever any morbid curvature is thus made, a ſecond turn, but in an oppoſite direction to the former, muſt be formed; both becauſe the muſcles on the convex ſide of the ſpine being ſtretched, muſt have a ſtronger natural contraction to draw the parts to which their ends are fixed, and becauſe the patient makes efforts to keep the centre of gravity of the body perpendicular to its baſe, that the muſcles may be relieved from a conſtant violent contractile ſtate, which always creates uneaſineſs and pain.

When once we underſtand how theſe crooked ſpines are produced, there is little difficulty in forming a juſt prognoſis; and a proper method of cure may be eaſily contrived, which muſt vary as to the internal medicines, according to the different cauſes on which the diſeaſe depends; but one general indication muſt be purſued by ſurgeons; which is, to counteract the bending force, by increaſing the compreſſion on the convex part of the curvature, and diminiſhing it on the concave ſide.

The manner of executing which in particular caſes muſt be different, and requires a very accurate examination of the circumſtances both of the diſeaſe and patient. In many ſuch caſes, I have

* Galen. de uſu par. lib. 1. cap. 16.

have found some simple directions, as to postures in which the patient's body should be kept, of very great advantage.

Though the true vertebræ agree in the general structure which I have hitherto described, yet because of several specialities proper to a particular number, they are commonly divided into three classes, viz. cervical, dorsal, and lumbar.

The cervical * are the seven uppermost vertebræ; which are distinguished from the rest by these marks. Their bodies are smaller and more solid than any others, and flatted on the fore part, to make way for the œsophagus; or rather this flat figure is owing to the pressure of that pipe, and to the action of the longi colli and anterior recti muscles. They are also flat behind, where small processes rise, to which the internal ligaments are fixed. The upper surface of the body of each vertebræ is made hollow, by a slanting thin process which is raised on each side; the lower surface is also excavated, but in a different manner; for here the posterior edge is raised a little, and the one before is produced a considerable way. Hence we see how the cartilages between those bones are firmly connected, and their articulations are secure.

The cartilages between these vertebræ are thick, especially at their fore part; which is one reason why the vertebræ advance forward as they descend, and have larger motion.

The oblique processes of these bones of the neck more justly deserve that name than those of any other vertebræ. They are situated slanting; the upper ones having their smooth and almost flat surfaces facing obliquely backwards and upwards, while the inferior oblique processes have these surfaces facing obliquely forwards and downwards.

The transverse processes of these vertebræ are framed in a very different manner from those of any other bones of the spine: for besides the common transverse process rising from between the oblique processes of each side, there is a second one that comes out from the side of the body of each vertebra; and these two processes, after leaving a circular hole for the passage of the cervical artery and vein, unite, and are considerably hollowed at their upper part, with rising sides, to protect the nerves that pass in the hollow; and at last each side terminates in an obtuse point, for the insertion of muscles.

The spinal processes of these cervical bones stand nearly streight backwards, are shorter than those of any other vertebra, and are forked or double at their ends; and hence allow a more convenient insertion to muscles.

The thick cartilages between the bodies of these cervical vertebræ, the obliquity of their oblique processes, and the shortness of and horizontal situation of their spinal processes, all conspire to allow them large motion.

The holes between the bony cross bridges, for the passages of the nerves from the spinal marrow, have their largest share formed in the lowest of the two vertebræ, to which they are common.

So far most of the cervical vertebræ agree; but they have some particular differences, which oblige us to consider them separately.

The first, from its use of supporting the head, has the name of *atlas*;* and is also called *epistrophea*, from the motion it performs on the second.

The atlas, contrary to all other vertebræ of the spine, has no body; but, instead of it, there is a bony arch. In the convex fore-part of which, a small rising appears, where the musculi longi colli are inserted; and on each side of this protuberance, a small cavity may be observed, where the recti interni minores take their rise. The upper and lower parts of the arch are rough and unequal, where the ligaments that connect this vertebra to the os occipitis, and to the second

* Ἀτλας, ἀτλάντος, colli.

* Ἀστράγαλος.

vertebra

vertebra are fixed. The back part of the arch is concave, ſmooth, and covered with a catilage, in a recent ſubject, to receive the tooth-like proceſs of the ſecond vertebra. In a firſt vertebra from which the ſecond has been ſeparated, this hollow makes the paſſage for the ſpinal marrow to ſeem much larger than it really is; on each ſide of it a ſmall rough ſinuoſity may be remarked, where the ligaments going to the ſides of the tooth-like proceſs of the following vertebra are faſtened; and on each ſide, a ſmall rough protuberance and depreſſion is obſervable, where the tranſverſe ligament, which ſecures the tooth-like proceſs in the ſinuoſity, is fixed, and hinders that proceſs from injuring the medulla ſpinalis in the flections of the head.

The atlas has as little ſpinal proceſs as body; but, inſtead thereof, there is a large bony arch, that the muſcles which paſs over this vertebra at that place might not be hurt in extending the head. On the back and upper part of this arch there are two depreſſions where the recti poſtici minores take their riſe; and at the lower part are two ſinuoſities, into which the ligaments which connect this bone to the following one are fixed.

The ſuperior oblique proceſſes of this atlas are large, oblong, hollow, and more horizontal than in any other vertebra. They riſe more in their external than internal brim; by which their articulations with the condyloid proceſſes of the os occipitis are firmer. Under the external edge of each of theſe oblique proceſſes, is the foſſa or deep open channel, in which the vertebral arteries make the circular turn, as they are about to enter the great foramen of the occipital bone, and where the tenth pair of nerves go out. In ſeveral bodies, I have ſeen this foſſa covered with bone. The inferior oblique proceſſes extending from within outwards and downwards, are large, concave, and circular. So that this vertebra, contrary to the other ſix, receives the bones with which it is articulated both above and below.

The tranſverſe proceſſes here are not much hollowed or forked, but are longer and larger than thoſe of any other vertebra or the neck, for the origin and inſertion of ſeveral muſcles; of which thoſe that ſerve to move this vertebra on the ſecond have a conſiderable lever to act with, becauſe of the diſtance of their inſertion from the axis of revolution.

The hole for the ſpinal marrow is larger in this than in any other vertebra, not only on account of the marrow being largeſt here, but alſo to prevent its being hurt by the motions of this vertebra on the ſecond one. This large hole, and the long tranſverſe proceſſes, make this the breadeſt vertebra of the neck.

The condyles of the os occipitis move forwards and backwards in the ſuperior oblique proceſſes of this vertebra; but from the figure of the bones forming theſe joints, it appears, that very little motion can here be allowed to either ſide; and there muſt be ſtill leſs circular motion.

In new-born children this vertebra has only the two lateral pieces oſſified; the arch, which it has at its fore-part, inſtead of a body, being cartilaginous.

The ſecond vertebra colli is called *dentata*, from the tooth-like proceſs on the upper part of its body. Some authors call it *epiſtrophea*, but improperly, ſince this deſignation is only applicable to the firſt, which moves on this as on an axis.

The body of this vertebra is ſomewhat of a pyramidal figure, being large, and produced downwards, eſpecially at its fore-ſide, to enter into a hollow of the vertebra below; while the upper part has a ſquare proceſs with a ſmall point ſtanding out from it. This it is that is imagined to reſemble a tooth,* and has given name to the vertebra. The ſide of this proceſs, on which the hollow of the

* Conoides, pyrenoides, odontoides.

anterior

anterior arch of the first vertebra plays, is convex, smooth, and covered with a cartilage; and it is of the same form behind, for the ligament, which is extended transversely from one rough protuberance of the first vertebra to the other, and is cartilaginous in the middle, to move on it: A ligament likewise goes out in an oblique transverse direction, from each side of the processus dentatus, to be fixed at its other end to the first vertebra, and to the occipital bone; and another ligament rises up from near the point of the process to the os occipitis.

The superior oblique processes of this vertebra dentata are large circular, very nearly in an horizontal position, and slightly convex, to be adapted to the inferior oblique processes of the first vertebra. A moveable cartilage is said by some authors to be interposed between these oblique processes of the first and second vertebra; but I could never find it. The inferior oblique processes of this vertebra dentata answer exactly to the description given of those common to all the cervical vertebra.

The transverse processes of the vertebra dentata are short, very little hollowed at their upper part, and not forked at their ends; and the canals through which the cervical arteries pass, are reflected outwards about the middle substance of each process; so that the course of these vessels may be directed towards the transverse processes of the first vertebra. Had this curvature of the arteries been made in a part so moveable as the neck is, while they were not defended by a bone, and fixed to that bone, scarce a motion could have been performed without the utmost hazard of compression, and a stop put to the course of the liquids, with all its train of bad consequences. Hence we observe this same mechanism several times made use of, when there is any occasion for a sudden curvature of a large artery. This is the third remarkable instance of it we have seen. The first was the passage of the carotids through the temporal bones; and the second was that lately described in the vertebral arteries, turning round the oblique processes of the first vertebra, to come at the great hole of the occipital bone.

The spinal process of this vertebra dentata is thick, strong, and short, to give sufficient origin to the musculi recti majores, and obliqui inferiores, and to prevent the contusion of these and other muscles in pulling the head back.

This second vertebra consists, at the birth, of four bony pieces; for, besides the three which I already mentioned as common to all the vertebræ, the tooth-like process of this bone is begun at this time to be ossified in its middle, and is joined as an appendix to the body of the bone. Lest this appendix be bended or displaced, nurses ought to keep the heads of new-born children from falling too far backwards by stay-bands, or some such means; till the muscles attain strength sufficient to prevent that dangerous motion.

When we are acquainted with the structure and articulations of the first and second vertebræ, and know exactly the strength and connection of their ligaments, there is no difficulty in understanding the motions that are performed upon or by the first; though this subject was formerly matter of hot dispute among some of the greatest anatomists.* It is none of my purpose at present to enter into a detail of the reasons advanced by either party; but to explain the fact, as any one may see it who will remove the muscles, which, in a recent subject, hinder the view of these two joints, and then will turn the head into all the different positions it is capable of. The head may then be seen to move forwards and backwards on the first vertebra, as was already said, while the atlas performs the circumgyratio upon the second vertebra; the inferior oblique processes of the first vertebra

* See Eustach de motu capitis.

ſhuffling eaſily in a circular way on the ſuperior oblique proceſſes of the ſecond, and its body or anterior arch having a rotation on the tooth-like proceſs, by which the perpendicular ligament that is ſent from the point of the tooth-like proceſs to the occipital bone is twiſted, while the lateral ligaments, that fix the proceſſus dentatus to the ſides of the firſt vertebra, and to the os occipitis, are very differently affected; for the one upon the ſide towards which the face is turned by the circumgyratio, is much ſhortened and lax, while the oppoſite one is ſtretched and made tenſe, and yielding at laſt no more, prevents the head from turning any farther round on this axis. So that theſe lateral ligaments are the proper moderators of the circumgyratio of the head here, which muſt be larger or ſmaller, as theſe ligaments are weaker or ſtronger, longer or ſhorter, and more or leſs capable of being ſtretched. Beſides the revolution on this axis, the firſt vertebra can move a ſmall way to either ſide; but is prevented from moving backwards and forwards, by its anterior arch, and by the croſs ligament, which are both cloſely applied to the tooth-like proceſs. Motion forwards here would have been of very bad conſequence, as it would have brought the beginning of the ſpinal marrow upon the point of the tooth-like proceſs.

The rotatory motion of the head is of great uſe to us on many accounts, by allowing us to apply quickly our organs of the ſenſes to objects; and the axis of rotation was altogether proper to be at this place; for if it had been at a greater diſtance from the head, the weight of the head, if it had at any time been removed from a perpendicular bearing to the ſmall very moveable joint, and thereby had acquired a long lever, would have broke the ligaments at every turn inconſiderately performed; or theſe ligaments muſt have been formed much ſtronger than could have been connected to ſuch ſmall bones. Neither could this circular motion be performed on the firſt vertebra without danger, becauſe the immoveable part of the medulla oblongata is ſo near, as at each large turn, the beginning of the ſpinal marrow would have been in danger of being twiſted, and of ſuffering by the compreſſion this would have made on its tender fibrils.

It is neceſſary to obſerve, that the lateral or moderator ligaments confine ſo much the motion of the firſt vertebra upon the ſecond, that though this joint may ſerve us on ſeveral occaſions, yet we are often obliged to turn our faces farther round, than could be done by this joint alone, without the greateſt danger of twiſting the ſpinal marrow too much, and alſo of laxating the oblique proceſſes; therefore, in large turns of this kind, the rotation is aſſiſted by all the vertebræ of the neck and loins, and if this is not ſufficient, we employ moſt of the joints of the lower extremities.

This combination of a great many joints towards the performance of one motion, is alſo to be obſerved in ſeveral other parts of the body; notwithſtanding ſuch motions being generally ſaid to be performed by ſome ſingle joint only.

The third vertebra of the neck is by ſome called *axis*; but this name is applied to it with much leſs reaſon than to the ſecond. This third, and the three below, have nothing particular in their ſtructure; but all their parts come under the general deſcription formerly given, each of them being larger as they deſcend.

The ſeventh * vertebra of the neck is near to the form of thoſe of the back, having the upper and lower ſurfaces of its body leſs hollow than the others; the oblique proceſſes are more perpendicular; neither ſpinal nor tranſverſe proceſſes are forked. This ſeventh and the ſixth vertebra of the neck have the hole in each of their tranſverſe proceſſes more frequently divided

* Atlas quibuſdam, maxima, magna vertebra, prominens.

by

by a ſmall croſs bridge, that goes between the cervical vein and artery, than any of the other vertebræ.

The twelve dorſal * may be diſtinguiſhed from the other vertebræ of the ſpine by the following marks :—

Their bodies are of a middle ſize, betwixt thoſe of the neck and loins; they are more convex before than either of the other two ſorts; and are flatted laterally by the preſſure of the ribs, which are inſerted into ſmall cavities formed in their ſides. This flatting on their ſides, which makes the figure of theſe vertebræ almoſt an half oval, is of good uſe, as it affords a firm articulation to the ribs, allows the trachea arteria to divide at a ſmall angle, and the other large veſſels to run ſecure from the actions of the vital organs. Theſe bodies are more concave behind than any of the other two claſſes. Their upper and lower ſurfaces are horizontal.

The cartilages interpoſed between the bodies of the vertebræ are thinner than in any other of the true vertebræ; and contribute to the concavity of the ſpine in the thorax, by being thinneſt at their fore part.

The oblique proceſſes are placed almoſt perpendicular; the upper ones ſlanting but a little forwards, and the lower ones ſlanting as much backwards. They have not as much convexity or concavity as is worth remarking. Between the oblique proceſſes of oppoſite ſides, ſeveral ſharp proceſſes ſtand out from the upper and lower parts of the plates which join to form the ſpinal proceſs; into theſe ſharp proceſſes ſtrong ligaments are fixed, for connecting the vertebræ.

The tranſverſe proceſſes of the dorſal vertebræ are long, thicker at their ends than in the middle, and turned obliquely backwards; which may be owing to the preſſure of the ribs, the tubercles of which are inſerted into a depreſſion near the end of theſe proceſſes.

The ſpinal proceſſes are long, ſmall pointed and ſloping downwards and backwards; from their upper and back-part a ridge riſes, which is received by a ſmall channel in the fore-part of the ſpinal proceſs immediately above, which is here connected to it by a ligament.

The conduit of the ſpinal marrow is here more circular, but, correſponding to the ſize of that cord, is ſmaller than in any of the other vertebræ, and a larger ſhare of the holes in the bony bridges, for the tranſmiſſion of the nerves, is formed in the vertebra above than in the one below.

The connection of the dorſal vertebræ to the ribs, the thinneſs of their cartilages, the erect ſituation of the oblique proceſſes, the length, ſloping, and connection of the ſpinal proceſſes, all contribute to reſtrain theſe vertebræ from much motion, which might diſturb all the actions of the heart and lungs; and, in conſequence of the little motion allowed here, the intervertebral cartilages ſooner ſhrivel, by becoming more ſolid; and therefore, the firſt remarkable curvature of the ſpine obſerved, as people advance to old age, is in the leaſt-ſtretched vertebræ of the back; or old people firſt become round-ſhouldered.

The bodies of the four uppermoſt dorſal vertebræ deviate from the rule of the vertebræ becoming larger as they deſcend; for the firſt of the four is the largeſt, and the other three below gradually become ſmaller, to allow the trachea and large veſſels to divide at ſmaller angles.

The two uppermoſt vertebræ of the back, inſtead of being very prominent forwards, are flatted by the action of the muſculi longi colli and recti majores.

The proportional ſize of the two little depreſſions in the body of each vertebra for receiving the heads of the ribs, ſeems to vary in the following manner: the depreſſion on the upper edge of each vertebra decreaſes as far down as the fourth, and after that increaſes.

The tranſverſe proceſſes are longer in each lower vertebra to the ſeventh or

* Θωραξ μεταφρένου κατω ὑποτραχήλιον antiſterni, pectoris, tergi.

or eighth, with their ſmooth ſurfaces, for the tubercles of the ribs, facing gradually more downwards; but afterwards as they deſcend they become ſhorter, and the ſmooth ſurfaces are directed more upwards.

The ſpinous proceſſes of the vertebræ of the back become gradually longer and more ſlanting from the firſt, as far down as the eighth or ninth vertebra; from which they manifeſtly turn ſhorter and more erect.

The firſt * vertebra, beſides an oblong hollow in its lower edge, that aſſiſts in forming the cavity wherein the ſecond rib is received, has the whole cavity for the head of the firſt rib formed in it.

The ſecond has the name of *axillary*,† without any thing particular in its ſtructure.

The eleventh ‡ often has the whole cavity for the eleventh rib in its body, and wants the ſmooth ſurface on each tranſverſe proceſs.

The twelfth § always receives the whole head of the laſt rib, and has no ſmooth ſurface on its tranſverſe proceſſes, which are very ſhort. The ſmooth ſurfaces of its inferior oblique proceſſes face outwards as the lumbar do. And we may ſay, in general, that the upper vertebræ of the back loſe gradually their reſemblance to thoſe of the neck, and the lower ones come nearer to the figure of the lumbar.

The articulation of the vertebræ of the back with the ribs, ſhall be more particularly conſidered after the ribs are deſcribed. Only it may be proper now to remark, that the ligaments which ſerve that articulation aſſiſt in connecting the vertebræ.

The loweſt order of the true vertebræ is the lumbar,‖ which are five bones that may be diſtinguiſhed from any others by theſe marks: 1. Their bodies, though of a circular form at their fore-part, are ſomewhat oblong from one ſide to the other; which may be occaſioned by the preſſure of the large veſſels, the aorta and cava, and of the viſcera. The epiphyſes on their edges are larger, and therefore the upper and lower ſurfaces of their bodies are more concave than in the vertebræ of the back. 2. The cartilages between theſe vertebræ are much the thickeſt of any, and render the ſpine convex within the abdomen, by the greateſt thickneſs being at their fore part. 3. The oblique proceſſes are ſtrong and deep; thoſe in oppoſite ſides being almoſt placed in parallel planes; the ſuperior, which are concave, facing inwards, and the convex inferior ones facing outwards; and therefore each of theſe vertebræ receives the one above it, and is received by the one below; which is not ſo evident in the other two claſſes already deſcribed. 4. Their tranſverſe proceſſes are ſmall, long, and almoſt erect, for allowing large motion to each bone, and ſufficient muſcles, and for ſupporting and defending the internal parts. 5. Betwixt the roots of the ſuperior oblique and tranſverſe proceſſes, a ſmall protuberance may be obſerved, where ſome of the muſcles that raiſe the trunk of the body are inſerted. 6. Their ſpinal proceſſes are ſtrong, ſtreight, and horizontal, with broad flat ſides, and a narrow edge above and below; this laſt being depreſſed on each ſide by muſcles. And at the root of theſe edges, we ſee rough ſurfaces for fixing the ligaments. 7. The canal for the numerous cords called *cauda equina*, into which the ſpinal marrow divides, is rather larger in theſe bones than what contains that marrow in the vertebræ of the back. 8. The holes for the paſſage of the nerves are more equally formed out of both the contiguous vertebræ than in the other claſſes; the upper one furniſhes however the larger ſhare of each hole.

The thick cartilages between theſe lumbar vertebræ, their deep oblique proceſſes

* Δοφία, gutturalis.

† Μασχαλιαίη.

‡ Λρέπης, in neutram partem inclinans.

§ Διασωτης, præcinctus.

‖ Οσφύος ἰξίος, ψοιών, renum, lumborum.

processes, are all fit for allowing large motion; though it is not so great as what is performed in the neck; which appears from comparing the arches which the head describes when moving on the neck, or the loins only.

The lumbar vertebræ, as they descend, have their oblique processes at a greater distance from each other, and facing more backwards and forwards.

Both transverse and spinal processes of the middlemost vertebræ of the loins are longest and thickest; in the vertebræ above and below they are less; so that these processes of the first * and fifth † are the least, to prevent their striking on the ribs or ossa ilium, or their bruising the muscles in the motions of the spine.

The epiphyses round the edges of the bodies of the lumbar vertebræ are most raised in the two lowest, which consequently make them appear hollower in the middle than the others are.

The body of the fifth vertebra is rather thinner than that of the fourth. The spinal process of this fifth is smaller, and the oblique processes face more backwards and forwards than in any other lumbar vertebra.

After considering the structure of the particular vertebræ, and their mutual connection, we may observe a sollicitous care taken that they shall not be disjoined but with great difficulty; for besides being connected by strong ligaments proportioned to the forces which are to be resisted, their bodies either enter so into each other, as to prevent their being displaced any way, as in the vertebræ of the neck, or they are propped on all sides, as these of the back are by the ribs; or their surfaces of contact are so broad, as to render the separation almost impracticable, as in the loins; while the depth or articulation of the oblique processes are exactly proportioned to the quantity of motion which the other parts of the bones allow, or the muscles can perform; yet, as these oblique processes are small, and therefore not capable of so secure a conjunction as the lager bodies, they may sooner yield to a disjoining force; but then their dislocation is not of near so bad consequence as the separation of the bodies would be. For by the oblique processes being dislocated, the muscles, ligaments, and spinal marrow, are indeed stretched; but this marrow must be compressed or entirely destroyed, when the body of the vertebræ is removed out of its place.

The *FALSE VERTEBRÆ* compose the under pyramid of the spine. They are distinguished from the bones already described justly enough by this epithet of false; because, though each bone into which they can be divided in young people, resembles the true vertebræ in figure, yet none of them contribute to the motion of the trunk of the body, they being intimately connected with each other in adults, except at their lower part, where they are moveable; whence they are commonly divided into two bones, os sacrum, and coccygis.

OS SACRUM,* is so called from being offered in sacrifice by the ancients, or rather because of its largeness in respect of the other vertebræ. This bone is of an irregular triangular shape, broad above, narrow below, convex behind, for the advantageous origin of the muscles that move the spine and thigh backwards; and concave behind, for enlarging the cavity of the pulvis. Four transverse lines of a colour different from the rest of the bone which are seen on its fore-part, are the marks of division of the five different bones of which it consists in young persons.

The fore-part of the os sacrum, analogous to the bodies of the true vertebræ, is smooth and flat, to allow a larger space for the contained bowels, without any danger of hurting

* Νεφριτης, renalis.

† Ασχαγίτης, fulciens.

* Ἱερον, Σπονδυλος μεγας Hippocrat. ὑποσπονδυλον, oribas. Πλατυ, latum, os clunium, clavium.

ing them; or this flat figure may be owing to the equal preſſure of theſe bowels, particularly of the laſt gut. The back part of it is almoſt ſtreight, without ſo large a cavity as the vertebræ have; becauſe the ſpinal marrow, now ſeparated into the cauda equina is ſmall. The bridges between the bodies and proceſſes of this bone, are much thicker, and in proportion ſhorter, than in the former claſs of bones. The ſtrength of theſe croſs bridges is very remarkable in the three upper bones, and is well proportioned to the incumbent weight of the trunk of the body, which theſe bridges ſuſtain in a tranſverſe, conſequently an unfavourable ſituation, when the body is erect.

There are only two oblique proceſſes of the os ſacrum; one ſtanding out on each ſide from the upper part of the firſt bone. Their plain erect ſurfaces face backwards, and are articulated with the inferior oblique proceſſes of the laſt vertebra of the loins, to which each of theſe proceſſes is connected by a ſtrong ligament, which riſes from a ſcabrous cavity round their roots, where mucilaginous glands are alſo lodged. Inſtead of the other oblique proceſſes of this bone, four rough tubercles are to be ſeen on each ſide of its ſurface behind, from which the muſculus ſacer has its origin.

The tranſverſe proceſſes here are all grown together into one large ſtrong oblong proceſs on each ſide; which, ſo far as it anſwers to the firſt three bones, is very thick, and divided into two irregular cavities by a long perpendicular ridge. The foremoſt of the two cavities has commonly a thin cartilaginous ſkin covering it in the recent ſubject, and is adapted to the unequal protuberance of the os ilium, and a ſtrong ligament connects the circumference of theſe ſurfaces of the two bones. The cavity behind is divided by a tranſverſe ridge into two, where ſtrong ligamentous ſtrings that go from this bone to the os ilium with a cellular ſubſtance containing mucus, are lodged.

The tranſverſe proceſſes of the two laſt bones of the os ſacrum are much ſmaller than the former. At their back part near their edge, a knob and oblong flat ſurface give riſe to two ſtrong ligaments which are extended to the os iſchium; and are therefore called *ſacroſciatic*.

The ſpinal proceſſes of the three uppermoſt bones of the os ſacrum appear ſhort, ſharp, and almoſt erect, while the two lower ones are open behind; and ſometimes a little knob is to be ſeen on the fourth, though generally it is bifurcated, without the two legs meeting into a ſpine; in which condition alſo the firſt is often to be ſeen; and ſometimes none of them meet, but leave a ſinus, or rather foſſa, inſtead of a canal.* The muſculus latiſſimus and longiſſimus dorſi, ſacrolumbalis, and glutæus maximus, have part of their origins from theſe ſpinal proceſſes.

The canal between the bodies and proceſſes of this bone, for the cauda equina, is triangular; and becomes ſmaller as it deſcends, as the cauda alſo does. Below the third bone, this paſſage is no more a complete bony canal, but is open behind, and is only there defended by a ſtrong ligamentous membrane ſtretched over it, which, with the muſcles that cover it, and are very prominent on each ſide, is a ſufficient defence for the bundle of nerves within.

At the root of each oblique proceſs of this bone the notch is conſpicuous, by which, and ſuch another in the laſt vertebra of the loins, a paſſage is left for the twenty-fourth ſpinal nerve; and, in viewing the os ſacrum, either before or behind, four large holes appear in each ſide, in much the ſame height, as where the marks of the union of its ſeveral bones remain. Some of the largeſt nerves of the body paſs through the anterior holes; and ſuperficial grooves running outwards from them in different directions, ſhew the courſe of theſe nerves. From the

* Verheyen, Anat. tract, 5. cap. 9. Sue Trad. d'oſteol. p. 127.

intervals

intervals of these grooves, the pyriformis muscle chiefly rises. The holes in the back part of the bone are covered by membranes which allow small nerves to pass through them. The two uppermost of these holes, especially on the fore-side, are the largest; and as the bone descends, the holes turn smaller. Sometimes a notch is only formed at the lower part in each side of this bone; and in other subjects there is a hole common to it and the os coccygis, through which the twenty-ninth pair of spinal nerves pass; and frequently a bony bridge is formed on the back-part of each side by a process sent up from the back-part of the os coccygis, and joined to the little knobs which the last bone of the os sacrum has instead of a spinal process. Under this bridge or jugum, the twenty-ninth pair of spinal nerves run in their course to the common holes just now described.

The upper part of the body of the first bone resembles the vertebræ of the loins; but the small fifth bone is oblong transversely, and hollow in the middle of its lower surface.

The substance of the os sacrum is very spongy, without any considerable solid external plates, and is lighter proportionally to its bulk than any other bone in the body; but is secured from injuries by the thick muscles that cover it behind, and by the strong ligamentous membranes that closely adhere to it. As this is one of the most remarkable instances of this sort of defence afforded a soft weak bone, we may make the general observation, that, where-ever we meet with such a bone, one or other, or both these defences are made use of, the first to ward off injuries, and the second to keep the substance of the bone from yielding too easily.

The bone is articulated above to the last vertebra of the loins, in the manner that the lumbar vertebræ are joined; and therefore the same motions may be performed here. The articulation of the lower part of the os sacrum to the os coccygis seems well enough adapted for allowing considerable motion to this last bone, was it not much confined by ligaments. Laterally, the os sacrum is joined to the ossa ilium by an immoveable synchondrosis, or what almost deserves the name of a suture; for the cartilaginous crust on the surface of the bones is very thin, and both their surfaces are so scabrous and unequal, as to be indented into each other; which makes such a strong connection, that great force is required to separate them, after all the muscles and ligaments are cut. Frequently the two bones grow together in old subjects.

The uses of the os sacrum are, to serve as the common base and support of the trunk of the body, to guard the nerves proceeding from the end of the spinal marrow, to defend the back-part of the pelvis, and to afford sufficient origin to the muscles which move the trunk and thigh.

The bones that compose the os sacrum of infants, have their bodies separated from each other by a thick cartilage; and, in the same manner as the true vertebræ, each of them consists of a body and two lateral plates, connected together by cartilages; the ends of the plates seldom being contiguous behind.

OS COCCYGIS,* or *rump bone*, is that triangular chain of bones depending from the os sacrum; each bone becoming smaller as they descend, till the last ends almost in a point. The os coccygis is convex behind, and concave before; from which crooked pyramidal figure, which was thought to resemble a cuckow's beak, it has got its name.

This bone consists of four pieces in people of middle age; in children, very near the whole of it is cartilage; in old subjects, all the bones are united, and become frequently one continued bone with the os sacrum.

The highest of the four bones is the largest, with shoulders extended far-

* Ὀβόπυγιον, ἄρθρον, condæ os, spondylium, os cuculi.

ther

ther to each side than the end of the os sacrum; which enlargement should in my opinion, serve as a distinguishing mark to fix the limits of either bone; and therefore should take away all dispute about reckoning the number of bones, of which one or other of these two parts of the false vertebræ is composed; which dispute must still be kept up, so long as the numbering five or six bones in the os sacrum depends upon the uncertain accident of this broad-shouldered little bone being united to or separated from it.

The upper surface of this bone is a little hollow. From the back of that bulbous part, called its shoulders, a process often rises up on each side, to join with the bifurcated spine of the fourth and fifth bones of the os sacrum, to form the bony bridge mentioned in the description of the os sacrum. Sometimes these shoulders are joined to the sides of the fifth bone of the os sacrum, to form the hole in each side common to these two bones, for the passage of the twenty-ninth pair of spinal nerves. Immediately below the shoulders of the os coccygis, a notch may be remarked in each side, where the thirtieth pair of the spinal nerves pass. The lower end of this bone is formed into a small head, which very often is hollow in the middle.

The three lower bones gradually become smaller, and are spongy; but are strengthened by a strong ligament which covers and connects them. Their ends, by which they are articulated, are formed in the same manner as those of the first bone are.

Between each of these four bones of young subjects a cartilage is interposed, therefore their articulation is analogous to that of the bodies of the vertebræ of the neck; for, as has been above remarked, the lower end of the os sacrum, and of each of the three superior bones of the os coccygis, has a small depression in the middle; and the upper part of all the bones of the os coccygis, is a little concave, and consequently the interposed cartilages are thickest in the middle, to fill up both cavities; by which they connect the bones more firmly. When the cartilages ossify, the upper end of each bone is formed into a cavity, exactly adapted to the protuberant lower end of the bone immediately above.

From this sort of articulation, it is evident, that, unless when these bones grow together, all of them are capable of motion; of which, the first and second, especially this last, enjoys the largest share.

The lower end of the fourth bone terminates in a rough point, to which a cartilage is appended.

To the sides of these bones of the os coccygis, the os coccygæi muscles,* and part of the levatores ani, and of the glutæi maximi, are fixed.

The substance of these bones is very spongy, and in children cartilaginous; there being only a part of the bone ossified in a new-born infant. Since therefore the intestinum rectum of children is not so firmly supported as it is in adults, this may be one reason why they are more subject to a procidentia ani than old people.†

From the description of this bone, we see how little it resembles the vertebræ; since it seldom has processes, never has any cavity for the spinal marrow, nor holes for the passage of nerves. Its connection hinders it to be moved to either side; and its motion backwards and forwards is much confined; yet, as its ligaments can be stretched by a considerable force, it is a great advantage in the excretion of the fæces alvinæ, and much more in child-bearing, that this bone should remain moveable; and the right management of it, in delivering women, may be of great benefit to them.‡ The mobility of the os coccygis diminishing as people advance in age, especially when its ligaments

* Douglas, Myograph. chap. 40. Eustach. tab. 56. No. 45, 20.

† Spigel. de humani corp. fabric. lib. 2. cap. 27. Paaw de offib. par. 2. cap. 3.

‡ Paaw, ibid. Deventer, Operat. chirurg. cap. 27.

and

and cartilages have not been kept flexible by being stretched; is probably one reason why the women, who are old maids before they marry, have generally hard labour in child-bed.

The os coccygis serves to sustain the intestinum rectum; and, in order to perform this office more effectually, it is made to turn with a curve forwards; by which also the bone itself, as well as the muscles and teguments, is preserved from any injury, when we sit with our body reclined back.

The second part of the trunk of the skeleton, the *PELVIS*, is the cylindrical cavity at the lower part of the abdomen, formed by the os sacrum, os coccygis, and ossa innominata; which last therefore fall now in course to be examined.

Though the name of *OSSA INNOMINATA* * contributes nothing to the knowledge of their situation, structure, or office, yet they have been so long universally known by it, that there is no occasion for changing it. They are two large broad bones, which form the fore part and sides of the pelvis, and the lower part of the sides of the abdomen. In children each of these bones is evidently divided into three; which are afterwards so intimately united, that scarce the least mark of their former separation remains; notwithstanding this, they are described as consisting each of three bones, to wit, the os ilium, ischium, and pubis; which I shall first describe separately, and then shall consider what is common to any two of them, or to all the three.

OS ILIUM † or *haunch-bone*, is situated highest of the three, and reaches as far down as one-third of the great cavity into which the head of the thigh-bone is received.

The external side of this bone is unequally convex, and is called its *dorsum*; the internal concave surface is by some, but improperly, named its *costa*. The semicircular edge at the highest part of this bone, which is tipped with a cartilage in the recent subject, is named the *spine*, into which the external or descending oblique muscle of the abdomen is inserted; and from it the internal ascending oblique and the transverse muscles of the belly, with the glutæus maximus, quadratus lumborum, and latissimus dorsi, have their origin. Some * are of opinion, that it is only the tendinous crust of all these muscles, and not a cartilage, as commonly alledged, that covers this bony edge. The ends of the spine are more prominent than the surface of the bone below them; therefore are reckoned processes. From the anterior spinal process, the sartorius and facialis muscles have their rise, and the outer end of the doubled tendon of the external oblique muscle of the abdomen, commonly called *Fallopius's* or *Poupart's* ligament, is fixed to it. The inside of the posterior spinal process, and of part of the spine forward from that, is made flat and rough where the sacro lumbales and longissimus dorsi rise; and to its outside ligaments, extended to the os sacrum and transverse processes of the fifth and fourth vertebræ of the loins, are fixed.† Below the anterior spinal process another protuberance stands out, which, by its situation, may be distinguished from the former, by adding the epithet of inferior, where the musculus rectus tibiæ has its origin.‡ Betwixt these two anterior processes the bone is hollowed where the beginning of the sartorius muscle is lodged. Below the posterior spinal process, a second protuberance of the edge of this bone is in like manner observable, which is closely applied to the os sacrum. Under this last process a considerable large niche is observable in the os ilium; between the sides of which and the strong ligament that is stretched

* Σκελέων, προσφύσεις, sacro conjuncta.

† Δαγονον, κενιαν, scaphium, lumbare, clunium, clavium, anchas.

* Winslow, Exposition anatomique du corps humain, traite des os frais, sect. 96.

† Weithrecht, Syndesmolog. sect. 4. sect. 39, 40, 46, 47.

‡ Baker, Curs. osteolog. demonst. 3.

over from the os sacrum to the sharp-pointed process of the os ischium of the recent subject, a large hole is formed, through which the musculus pyriformis, the great sciatic nerve, and the posterior crural vessels pass, and are protected from compression.

The external broad side or dorsum of the os ilium is a little hollow towards the fore part; farther back it is as much raised; then is considerably concave; and lastly, it is convex. These inequalities are occasioned by the actions of the muscles that are situated on this surface. From behind the uppermost of the two anterior spinal processes, in such bones as are strongly marked by the muscles, a semicircular ridge is extended to the hollow passage of the sciatic nerve. Between the spine and this ridge, the glutæus medius takes its rise. Immediately from above the lowest of the anterior spinal processes, a second ridge is stretched to the niche. Between this and the former ridge, the glutæus minimus has its origin. On the outside of the posterior spinal processes, the dorsum of the os ilium is flat and rough, where part of the musculus glutæus maximus and pyriformis rises. The lowest part of this bone is the thickest, and is formed into a large cavity with high brims, to assist in composing the great acetabulum; which shall be considered, after all the three bones that constitute the os innominatum are described.

The internal surface of the os ilium is concave in its broadest fore part, where the internal iliac muscle has its origin, and some share of the intestinum ilium and colon is lodged. From this large hollow, a small sinuosity is continued obliquely forwards, at the inside of the anterior inferior spinal process, where part of the psoas and iliacus muscles, with the crural vessels and nerves, pass. The large concavity is bounded below by a sharp ridge, which runs from behind forwards; and, being continued with such another ridge of the os pubis, forms a line of partition between the abdomen and pelvis. Into this ridge the broad tendon of the psoas parvus is inserted.

All the interior surface of the os ilium, behind this ridge, is very unequal; for the upper part is flat, but spongy, where the sacrolumbalis and longissimus dorsi rise. Lower down, there is a transverse ridge from which ligaments go out to the os sacrum. Immediately below this ridge, the rough unequal cavities and prominences are placed, which are adapted to those described on the side of the os sacrum. In the same manner, the upper part of this rough surface is porous, for the firmer adhesion of the ligamentous cellular substance; while the lower part is more solid, and covered with a thin cartilaginous skin, for its immoveable articulation with the os sacrum. From all the circumference of this large unequal surface, ligaments are extended to the os sacrum, to secure more firmly the conjunction of these bones.

The passages of the medullary vessels are very conspicuous, both in the dorsum and costa of many ossa ilium; but in others they are inconsiderable.

The posterior and lower parts of these bones are thick; but they are generally exceeding thin and compact at their middle, where they are exposed to the actions of the musculi glutæi and iliacus internus, and to the pressure of the bowels contained in the belly. The substance of the ossa ilium is mostly cellular, except a thin external table.

In a ripe child, the spine of the os ilium is cartilaginous, and is afterwards joined to the bone in form of an epiphyse. The large lower end of this bone is not completely ossified.

OS ISCHIUM,* or *hip-bone*, is of a middle bulk between the two other parts of the os innominatum; is situated lowest of the three, and is of a very irregular figure. Its extent might be marked by an horizontal line drawn

* Coxæ, coxendicis, pixis.

near through the middle of the acetabulum; for the upper bulbous part of this bone forms some less than the lower half of that great cavity, and the small leg of it rises to much the same height on the other side of the great hole common to this bone and the os pubis.

The upper thick part of the os ischium, a sharp process, called by some spinous, stands out backwards, from which chiefly the musculus coccygæus and superior gemellus, and part of the levator ani, rise; and the anterior or internal sacrosciatic ligament is fixed to it. Between the upper part of this ligament and the bones, it was formerly observed that the pyriform muscle, the posterior crural vessels, and the sciatic nerve, pass out of the pelvis. Immediately below this process, a sinuosity is formed for the tendon of the musculus obturator internus. In a recent subject, this part of the bone, which serves as a pully on which the obturator muscle plays, is covered with a ligamentous cartilage, that, by two or three small ridges, points out the interstices of the fibres in the tendon of this muscle. The outer surface of the bone at the root of this spinous process is made hollow by the pyriformis or iliacus externus muscle.

Below the sinuosity for the obturator muscle, is the great knob or tuberosity, covered with cartilage or tendon.* The upper part of the tuberosity gives rise to the inferior gemellus muscle. To a ridge at the inside of this, the external or posterior sacrosciatic ligament, is so fixed, that between it, the internal ligament, and the sinuosity of the os ischium, a passage is left for the internal obturator muscle. The upper thick smooth part of the tuber, called by some its dorsum, has two oblique impressions on it. The inner one gives origin to the long head of the biceps flexor tibiæ and seminervosus muscles, and the semimembranosus rises from the exterior one, which reaches higher and nearer the acetabulum than the other. The lower, thinner, more scabrous part of the knob which bends forwards, is also marked with two flat surfaces, whereof the internal is what we lean upon in sitting, and the external gives rise to the largest head of the triceps adductor femoris. Between the external margin of the tuberosity and the great hole of the os innominatum, there is frequently an obtuse ridge extended down from the acetabulum, which gives origin to the quadratus femoris. As the tuber advances forwards, it becomes smaller, and is rough, for the origin of the musculus transversalis and erector penis. The small leg of it, which mounts upwards to join the os pubis, is rough and prominent at its edge, where the two lower heads of the triceps or quadriceps adductor femoris take their rise.

The upper and back part of the os ischium is broad and thick; but its lower and fore part is narrower and thinner. Its substance is of the structure common to broad bones.

The os ilium and pubis of the same side are the only bones which are contiguous to the os ischium.

The part of the os ischium which forms the acetabulum, the spinous process, the great tuber, and the recurved leg, are all cartilaginous at birth. The tuber, with part of the leg or process above it, becomes an epiphyse before this bone is fully formed.

The *OS PUBIS*,* or *share-bone*, is the least of the three parts of the os innominatum, and is placed at the upper fore part of it. The thick largest part of this bone is employed in forming the acetabulum; from which becoming much smaller, it is stretched inwards to its fellow on the other side, where again it grows larger

* Winslow, Exposit. anat. des os frais, sect. 96.

* [illegible], pectinis, penis, pudibundum, fenestratum.

larger, and sends a small branch downwards, to join the end of the small leg of the os ischium. The upper forepart of each os pubis is tuberous and rough where the musculus rectus and pyramidals are inserted. From this a ridge is extended along the upper edge of the bone, in a continued line with such another of the os ilium, which divides the abdomen and pelvis. The ligament of Fallopius is fixed to the internal end of this ridge, and the smooth hollow below it is made by the psoas and iliacus internus muscles passing with the anterior crural vessels and nerves behind the ligament. Some way below the former ridge, another is extended from the tuberous part of the os pubis downwards and outwards towards the acetabulum; between these two ridges the bone is hollow and smooth, for lodging the head of the pectineus muscle. Immediately below, where the lower ridge is to take the turn downwards, a winding niche is made, which is comprehended in the great foramen of a skeleton, but is formed into a hole by a subtended ligament in the recent subject, for the passage of the posterior crural nerve, an artery, and a vein. The internal end of the os pubis is rough and unequal, for the firmer adhesion of the thick ligamentous cartilage that connects it to its fellow on the other side; the process which goes down from that to the os ischium is broad and rough before, where the gracilis and upper heads of the triceps, or rather quadriceps adductor femoris, have their origin.

The substance of the os pubis is the same as the other broad bones.

Only a part of the large end of this bone is ossified, and the whole leg is cartilaginous in a child born at the full time.

Betwixt the os ischium and pubis a very large irregular hole is left, which, from its resemblance to a door or shield, has been called *thyroides*. This hole is all, except the niche for the posterior and crural nerve, filled up in a recent subject with a strong ligamentous membrane, that adheres very firmly to its circumference. From this membrane chiefly the obturator muscles, external and internal, take their rise. The great design of this hole, besides rendering the bone lighter, is to allow a strong-enough origin to the obturator muscles, and sufficient space for lodging their bellies, that there may be no danger of disturbing the functions of the contained viscera of the pelvis by the actions of the internal, nor of the external being bruised by the thigh-bone, especially by its lesser trochanter, in the motion of the thigh inwards; both which inconveniences must have happened, had the ossa innominata been complete here, and of sufficient thickness and strength to serve as the fixed point of these muscles. The bowels sometimes make their way through the niche for the vessels, at the upper part of this thyroid hole; and this causes a hernia in this place.*

In the external surface of the ossa innominata, near the outside of the great hole, a large deep cavity is formed by all the three bones conjunctly; for the os pubis constitutes about one fifth; the os ilium makes something less than two-fifths, and the os ischium a much more than two fifths. The brims of this cavity are very high, and are still much more enlarged by the ligamentous cartilage with which they are tipped in a recent subject. From this form of the cavity, it has been called *acetabulum*; and for a distinguishing character, the name of the bone that constitutes the largest share of it is added; therefore acetabulum ossis ischii † is the name this cavity commonly bears. Round the base of the supercilia the bone is rough and unequal, where the capsular ligament of the articulation is fixed. The brims at the upper and back part of

* Memoires de l'acad. de chirurgie, tom. 1. p. 707. &c.

† Coxæ, coxendicis.

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the acetabulum are much larger and higher than any where else; which is very necessary to prevent the head of the femur from slipping out of its cavity at this place, where the whole weight of the body bears upon it, and consequently would otherwise be constantly in danger of thrusting it out.

As these brims are extended downwards and forwards, they become less; and at their internal lower part a breach is made in them; from the one side of which to the other, a ligament is placed in the recent subject; under which a large hole is left, which contains a fatty cellular substance and vessels. The reason of which appearance has afforded matter of debate. To me it seems evidently contrived for allowing a larger motion to the thigh inwards; for if the bony brims had been here continued, the neck of the thigh-bone must have struck upon them when the thighs were brought across each other; which, in a large strong motion this way, would have endangered the neck of the one bone, or brim of the other. Then the vessels which are distributed to the joint may safely enter at the sinuosity in the bottom of the breach; which being however larger than is necessary for that purpose, allows the large mucilaginous gland of the joint to escape below the ligament, when the head of the thigh-bone is in hazard of pressing too much upon it in the motions of the thigh outwards.* Besides this difference in the height of the brims, the acetabulum is otherwise unequal; for the lower internal part of it is depressed below the cartilaginous surface of the upper part, and is not covered with cartilage; into the upper part of this particular depression, where it is deepest and of a semilunar form, the ligament of the thigh-bone, commonly though improperly called the *round* one, is inserted; while, in its more superficial lower part, the large mucilaginous gland of this joint is lodged. The largest share of this separate depression is formed in the os ischium.

From what has been said of the condition of the three bones composing this acetabulum in new-born children, it must be evident that a considerable part of this cavity is cartilaginous in them.

The ossa innominata are joined at their back part to each side of the os sacrum by a sort of suture, with a very thin intervening cartilage, which serves as so much glue to cement these bones together; and strong ligaments go from the circumference of this unequal surface, to connect them more firmly. The ossa innominata are connected together at their fore part by the ligamentous cartilage interposed between the two ossa pubis. These bones can therefore have no motion in a natural state, except what is common to the trunk of the body, or to the os sacrum. But it has been disputed, whether or not they loosen so much from each other, and from the os sacrum, in child-birth, by the flow of mucus to the pelvis, and by the throws of the labour, as that the ossa pubis recede from each other, and thereby allow the passage between the bones to be enlarged. Several observations* shew that this relaxation sometimes happens; but those who had frequently opportunities of dissecting the bodies of women who died immediately after being delivered of children, teach us to beware of regarding this as the common effect of child-birth; for they found such a relaxation in very few of the bodies which they examined.†

Considering what great weight is supported in our erect posture, by the articulation of the ossa innominata with the os sacrum, there is great reason to think, that if the conglutinated

* Petit, Memoires de l'acad. des sciences, 1722.

* Bauchin. Theat. anat. lib. 1. cap. 49. Spigel. anat. lib. 2. cap. 24. Riolan. Anthropogr. lib. 6. cap. 12. Diemerbroeck. anat. lib. 9. cap. 16.

† Hildan. Epist. cent. obs. 46. Dionis Sixieme demonst. des os. Morgagn. Advers. 3. anim. ad. 13.

nated ſurfaces of theſe bones were once ſeparated (without which, the oſſa pubis cannot ſhuffle on each other) the ligaments would be violently ſtretched, if not torcn; from whence many diſorders would ariſe.*

Each os innominatum affords a ſocket (the acetabulum) for the thigh-bones to move in, and the trunk of the body rolls here ſo much on the thigh-bones, as to allow the moſt conſpicuous motions of the trunk, which are commonly thought to be performed by the bones of the ſpine. This articulation is to be more fully deſcribed after the oſſa femoris are examined.

The pelvis then has a large opening above where it is continued with the abdomen, is ſtrongly fenced by bones on the ſides, back, and fore part, and appears with a wide opening below, in the ſkeleton; but in the recent ſubject, a conſiderable part of the opening is filled by the ſacroſciatic ligaments, pyriform internal obturator, levatores ani, gemini, and coccygæi muſcles, which ſupport and protect the contained parts better than bones could have done; ſo that ſpace is only left at the loweſt part of it, for the large excretories, the veſica urinaria, inteſtinum rectum, and in females the uterus, to diſcharge themſelves.

The *THORAX*,† or *cheſt*, which is the only part of the trunk of the body which we have not yet deſcribed, reaches from below the neck to the belly; and, by means of the bones that guard it, is formed into a large cavity: the figure of which is ſomewhat conoidal; but its upper ſmaller end is not finiſhed, being left open for the paſſage of the wind-pipe, gullet, and large blood-veſſels: and its lower part or baſe, has no bones, and is ſhorter before than behind; ſo that, to carry on our compariſon, it appears like an oblique ſection of the conoid. Beſides which we ought alſo to remark, that the lower part of this cavity is narrower than ſome way above;* and that the middle of its back-part is conſiderably diminiſhed by the bones ſtanding forwards into it.

The bones which form the thorax are the twelve dorſal vertebræ behind, the ribs on the ſides, and the ſternum before.

The vertebræ have already been deſcribed as part of the ſpine; and therefore are now to be paſſed.

The *RIBS*, or *coſtæ*,† (as if they were cuſtodes, or guards, to theſe principal organs of the animal machine, the heart and lungs) are the long crooked bones placed at the ſide of the cheſt, in an oblique direction downwards in reſpect of the back-bone. Their number is generally twelve on each ſide; though frequently eleven or thirteen have been found.‡ Sometimes the ribs are found preternaturally conjoined or divided.‖

The ribs are all concave internally; where they are alſo made ſmooth by the action of the contained parts, which, on this account, are in no danger of being hurt by them; and they are convex externally, that they might reſiſt that part of the preſſure of the atmoſphere, which is not ballanced by the air within the lungs, during inſpiration. The ends of the ribs next the vertebræ are rounder than they are after theſe bones have advanced forwards, when they become flatter and broader, and have an upper and lower edge, each of which is made rough by the action of the intercoſtal muſcles, inſerted into them. Theſe muſcles, being all of nearly equal force, and equally ſtretched in the interſtices of the ribs, prevent the broken ends of theſe bones in a fracture from being removed far out of their natural place, to interrupt the motion of the vital organs. The

* Ludov. in Ephem. German. dec. 1. ann. 3. obſ. 255.

† Pectus, caſſum.

* Albin. de oſſib. ſect. 169.

† Πλευραι, περιϛιθια, Cpaſſae.

‡ Riolan. Comment. de oſſibus, cap. 19. Marchetti. cap. 9. Cowper Explicat. cap. 93. and 94. Morgagn. Adverſ. anat.

‖ Sue Trad. d'oſteolog. p. 41.

upper

upper edge of the ribs is more obtuse and rounder than the lower, which is depressed on its internal side by a long fossa, for lodging the intercostal vessels and nerves; on each side of which there is a ridge, to which the intercostal muscles are fixed. The fossa is not observable however at either end of the ribs; for at the posterior or root, the vessels have not yet reached the ribs; and, at the fore end, they are split away into branches, to serve the parts between the ribs; which plainly teaches surgeons one reason of the greater safety of performing the operation of the empyema towards the sides of the thorax, than either near the back or the breast.

At the posterior * end of each rib, a little head is formed, which is divided by a middle ridge into two plain or hollow surfaces; the lowest of which is the broadest and deepest in most of them. The two plains are joined to the bodies of two different vertebræ, and the ridge forces itself into the intervening cartilage. A little way from this head, we find, on the external surface, a small cavity, where mucilaginous glands are lodged; and round the head, the bone appears spongy, where the capsular ligament of the articulation is fixed. Immediately beyond this a flatted tubercle rises, with a small cavity at it, and roughness about its root, for the articulation of the rib with the transverse process of the lowest of the two vertebræ, with the bodies of which the head of the rib is joined. Advancing farther on this external surface, we observe in most of the ribs another smaller tubercle, into which ligaments which connect the ribs to each other, and to the transverse processes of the vertebræ and portions of the longissimus dorsi, are inserted. Beyond this the ribs are made flat by the sacro-lumbalis muscle, which is inserted into the part of this flat surface farthest from the spine, where each rib makes a considerable curve, called by some its *angle*. Then the rib begins to turn broad, and continues so to is anterior end,* which is hollow and spongy, for the reception of and firm coalition with the cartilage that runs thence to be inserted into the sternum, or to be joined with some other cartilage. In adults, generally the cavity at this end of the ribs is smooth and polished on its surface; by which the articulation of the cartilage with it has the appearance of being designed for motion; but it has none.

The substance of the ribs is spongy, cellular, and only covered with a very thin external lamellated surface, which increases in thickness and strength as it approaches the vertebræ.

To the fore-end of each rib a long broad and strong cartilage is fixed, and reaches thence to the sternum, or is joined to the cartilage of the next rib. This course, however, is not in a streight line with the ribs; for generally the cartilages make a considerable curve, the concave part of which is upwards; therefore, at their insertion into the sternum, they make an obtuse angle above, and an acute one below. These cartilages are of such a length as never to allow the ribs to come to a right angle with the spine; but they keep them situated so obliquely, as to make an angle very considerably obtuse above, till a force exceeding the elasticity of the cartilage is applied. These cartilages, as all others, are firmer and harder internally, than they are on their external surface; and sometimes, in old people, all their middle substance becomes bony, while a thin cartilaginous lamella appears externally.† The ossification however begins frequently at the external surface. The greatest alternate motions of the cartilages being made at their great curvature, that part remains frequently cartilaginous, after all the rest is ossified.‡

The ribs then are articulated at each end, of which the one behind is doubly

* Κάπιον, remulus.

* Πλατη, palmula.

† Vesal. lib. 2. cap. 19.

‡ Havers. Osteolog. nov. dis. 5. p. 289.

doubly joined to the vertebræ; for the head is received into the cavities of the two bodies of the vertebræ, and the larger tubercle is received into the depreſſion in the tranſverſe proceſs of the lower vertebræ. When one examines the double articulation, he muſt immediately ſee, that no other motion can here be allowed than upwards and downwards; ſince the tranſverſe proceſs hinders the rib to be thruſt back; the reſiſtance on the other ſide of the ſternum prevents the ribs coming forward, and each of the two joints, with the other parts attached, oppoſe its turning round. But then it is likewiſe as evident, that even the motion upwards and downwards can be but ſmall in any one rib at the articulation itſelf. But as the ribs advance forwards, the diſtance from their centre of motion increaſing, the motion muſt be larger; and it would be very conſpicuous at their anterior ends, were not they reſiſted there by the cartilages, which yield ſo little, that the principal motion is performed by the middle part of the ribs, which turn outwards and upwards, and occaſions the twiſt remarkable in the long ribs at the place near their fore end where they are moſt reſiſted.*

Hitherto I have laid down the ſtructure and connection which moſt of the ribs enjoy, as belonging to all of them; but muſt now conſider the ſpecialities wherein any of them differ from the general deſcription given, or from each other.

In viewing the ribs from above downwards, their figure is ſtill ſtreighter; the uppermoſt being the moſt crooked of any. Their obliquity in reſpect of the ſpine increaſes as they deſcend; ſo that though their diſtances from each other are very little different at their back part, yet at their fore ends the diſtances between the lower ones muſt increaſe. In conſequence too of this increaſed obliquity of the lower ribs, each of their cartilages makes a greater curve in its progreſs from the rib towards the ſternum; and the tubercles, that are articulated to the tranſverſe proceſſes of the vertebræ, have their ſmooth ſurfaces gradually facing more upwards. The ribs becoming thus more oblique, while the ſternum advances forwards in its deſcent, make the diſtance between the ſternum and the anterior end of the lower ribs greater than between the ſternum and the ribs above; conſequently the cartilages of thoſe ribs that are joined to the breaſt-bone are longer in the lower than in the higher ones. Theſe cartilages are placed nearer to each other as the ribs deſcend, which occaſion the curvature of the cartilages to be greater.

The length of the ribs increaſes from the firſt and uppermoſt rib, as far down as the ſeventh; and from that to the twelfth, as gradually diminiſhes. The ſuperior of the two plain or rather hollow ſurfaces, by which the ribs are articulated to the bodies of the vertebræ, gradually increaſes from the firſt to the fourth rib, and is diminiſhed after that in each lower rib. The diſtance of their angles from the heads always increaſes as they deſcend to the ninth, becauſe of the greater breadth of the ſacrolumbalis muſcle.*

The ribs are commonly divided into true and falſe.

The true † coſtæ are the ſeven upper ones of each ſide, whoſe cartilages are all gradually longer as the ribs deſcend, and are joined to the breaſt-bone; ſo that being preſſed conſtantly between two bones, they are flatted at both ends, and are thicker, harder, and more liable to oſſify, than the other cartilages, that are not ſubject to ſo much preſſure. Theſe ribs include the heart and lungs; and therefore are the proper or true cuſtodes of life.

* Winſlow. Memoires de l'acad. des ſciences, 1720.

* Winſlow. Expoſition anatomique des os ſecs, ſect. 642.

† Γνησαι, Germanæ, legitimæ,

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The five inferior ribs of each side are the false or bastard,* whose cartilages do not reach to the sternum; and therefore, wanting the resistance at their fore part, they are there pointed; and, on this account, having less pressure, their substance is softer. The cartilages of these false ribs are shorter as the ribs descend. To all these five ribs the circular edge of the diaphragm is connected; and its fibres, instead of being stretched immediately transversely, and so running perpendicularly to the ribs, are pressed so as to be often, especially in expiration, parallel to the plane in which the ribs lie; nay, one may judge by the attachments which these fibres have so frequently to the sides of the thorax, a considerable way above where their extremities are inserted into the ribs, and by the situation of the viscera, always to be observed in a dead subject laid supine, that there is constantly a large concavity formed on each side by the diaphragm within these bastard ribs, in which the stomach, liver, spleen, &c. are contained; which, being only reckoned among the viscera naturalia, have occasioned the name of bastard custodes to these bones.

Hence in simple fractures of the false ribs, without fever, the stomach ought to be kept moderately filled with food, lest the pendulous ribs falling inwards, should thereby increase the pain, cough, &c † Hence likewise we may learn how to judge better of the seat of several diseases, and to do the operation of the empyema, and some others, with more safety than we can do if we follow the common directions.

The eight upper ribs were formerly ‡ classed into pairs, with particular names to each two, to wit, the *crooked*, the *solid*, the *pectoral*, the *twisted*; but these names are of so little use, that they are now generally neglected.

The first rib of each side is so situated, that the flat sides are above and below, while one edge is placed inwards, and the other outwards, or nearly so; therefore sufficient space is left above it for the subclavian vessels and muscle; and the broad concave surface is opposed to the lungs; but then, in consequence of this situation, the channel for the intercostal vessels is not to be found, and the edges are differently formed from all the other, except the second; the lower one being rounded, and the other sharp. The head of this rib is not divided into two plain surfaces by a middle ridge, because it is only articulated with the first vertebra of the thorax. Its cartilage is ossified in adults, and is united to the sterdum at right angles. Frequently this first rib has a ridge rising near the middle of its posterior edge, where one of the heads of the scalenus muscle rises. Farther forward it is flatted, or sometimes depressed by the clavicle.

The fifth, sixth, and seventh, or rather the sixth, seventh, eighth, and sometimes the fifth, sixth, seventh, eighth, ninth ribs, have their cartilages at least contiguous; and frequently they are joined to each other by cross cartilages; and most commonly the cartilages of the eighth, ninth, tenth, are connected to the former and to each other by firm ligaments.

The eleventh, and sometimes the tenth rib, has no tubercle for its articulation with the transverse process of the vertebra, to which it is only loosely fixed by ligaments. The fossa in its lower edge is not so deep as in the upper ribs, because the vessels run more towards the interstice between the ribs. Its fore end is smaller than its body, and its short small cartilage is but loosely connected to the cartilage of the rib above.

The twelfth rib is the shortest and straightest. Its head is only articulated with the last vertebra of the thorax;

* Μαλθακαι, χονδροδεις, ἀκανθαι, νοθαι, ὑιοι, adulterinæ, spuriæ, ill-gitimæ.

† Hipocrat. de articulo, sect. 51. Pare, lib. 15. cap. 11.

‡ Laurent. Hist. anat. lib. 2. cap. 29. Paaw, de ossibus, part. 3. cap. 2.

thorax; therefore is not divided into two surfaces. This rib is not joined to the transverse process of the vertebra, and therefore has no tubercle, being often pulled necessarily inwards by the diaphragm, which an articulation with the transverse process would not have allowed. The fossa is not found at its under edge, because the vessels run below it. The fore part of this rib is smaller than its middle, and has only a very small pointed cartilage fixed to it. To its whole internal side the diaphragm is connected.

The motions and uses of the ribs shall be more particularly treated of, after the description of the sternum.

The heads and tubercles of the ribs of a new-born child have cartilages on them; part of which become afterwards thin epiphyses. The bodies of the ribs encroach gradually after birth upon the cartilages; so that the latter are proportionably shorter, when compared to the ribs, in adults than in children.

Here I cannot help remarking the wise providence of our Creator, in preserving us from perishing as soon as we come into the world. The end of the bones of the limbs remain in a cartilaginous state after birth, and are many years before they are entirely united to the main body of their several bones; whereas the condyles of the occipital bone, and of the lower jaw, are true original processes, and ossified before birth, and the heads and tubercles of the ribs are nearly in the same condition; and therefore the weight of the large head is firmly supported; the actions of sucking, swallowing, respiration, &c. which are indispensably necessary for us as soon as we come into the world, are performed without danger of separating the parts of the bones that are most pressed on in these motions; whereas, had these processes of the head, jaw, and ribs, been epiphyses at birth, children must have been exposed to danger of dying by such a separation; the immediate consequences of which would be the compression of the beginning of the spinal marrow, or want of food, or a stop put to respiration.

The *STERNUM*,* or *breast-bone*, is the broad flat bone, or pile of bones, at the fore part of the thorax. The number of bones which this should be divided into, has occasioned debates among anatomists, who have considered it in subjects of different ages. In adults of a middle age, it is composed of three bones, which easily separate after the cartilages connecting them are destroyed. Frequently the two lower bones are found intimately united; and very often in old people, the sternum is a continued bony substance from one end to the other; though we still observe two, sometimes three, transverse lines on its surface; which are marks of the former divisions.

When we consider the sternum as one bone, we find it broadest and thickest above, and becoming smaller as it descends. The internal surface of this bone is somewhat hollowed for enlarging the thorax; but the convexity on the external surface is not so conspicuous, because the sides are pressed outwards by the true ribs; the round heads of whose cartilages are received into seven smooth pits, formed on each side of the sternum, and are kept firm there by strong ligaments, which on the external surface have a particular radiated texture.† Frequently the cartilaginous fibres thrust themselves into the bony substance of the sternum, and are joined by a sort of suture. The pits at the upper part of the sternum are at the greatest distance one from another, and as they descend, are nearer; so that the two lowest are contiguous.

The substance of the breast-bone is cellular, with a very thin external plate, especially on its internal surface, where we may frequently observe a cartilaginous crust spread over it.‡ On both surfaces, however, a strong ligamentous membrane is closely braced,

* Στῆθος, os pectoris, ensiforme, scutum cordis.

† Ruysch. Catalog. rar. fig. 9.

‡ Jac. Sylv. in Galen de ossibus, cap. 12.

and

and the cells of this bone are so small that a considerable quantity of osseous fibres must be employed in the composition of it; whence, with the defence which the muscles give it, and the moveable support it has from the cartilages, it is sufficiently secured from being broken; for it is strong by its quantity of bone, its parts are kept together by ligaments, and it yields enough to elude considerably the violence offered.*

So far may be said of this bone in general; but the three bones, of which, according to the common account, it is composed in adults, are each to be examined.

The first, all agree, is somewhat of the figure of a heart, as it is commonly painted; only it does not terminate in a sharp point. This is the uppermost thickest part of the sternum.

The upper middle part of this first bone, where it is thickest, is hollowed, to make place for the trachea arteria; this cavity † is principally formed by the bone being raised on each side of it, partly by the clavicles thrusting it inwards, and partly by the sterno mastoidei muscles pulling it upwards. On the outside of each tubercle, there is an oblong cavity, that in viewing it transversely from before backwards, appears a little convex; into these glenæ, the ends of the clavicles are received. Immediately below these, the sides of this bone begin to turn thinner; and in each a superficial cavity or a rough surface is to be seen, where the first ribs are received or joined to the sternum. In the side of the under end of this first bone, the half of the pit for the second rib on each side is formed. The upper part of the surface behind is covered with a strong ligament, which secures the clavicles; and is afterwards to be more particularly taken notice of.

The second or middle division of this bone is much longer, narrower, and thinner, than the first; but, excepting that it is a little narrower above than below, it is nearly equal all over in its dimensions of breadth or thickness. In the sides of it are complete pits for the third, fourth, fifth, and sixth ribs, and an half of the pits for the second and seventh. The lines, which are marks of the former division of this bone, being extended from the middle of the pits of one side to the middle of the corresponding pits of the other side. Near its middle an unossified part of the bone is sometimes found, which, freed of the ligamentous membrane or cartilage that fills it, is described as a hole; and in this place, for the most part, we may observe a transverse line, which has made authors divide this bone into two. When the cartilage between this and the first bone is not ossified, a manifest motion of this upon the first may be observed in respiration, or in raising the sternum, by pulling the ribs upwards or distending the lungs with air in a recent subject.

The third bone is much less than the other two, and has only one half of the pit for the seventh rib formed in it; wherefore it might be reckoned only an appendix of the sternum. In young subjects it is always cartilaginous, and is better known by the *cartilago xiphoides* or *ensiformis*,* than any other; though the ancients often called the whole sternum *ensiforme*, comparing the two first bones to the handle, and this appendix to the blade, of a sword. This third bone is seldom of the same figure, magnitude, or situation, in any two subjects; for sometimes it is a plain triangular bone, with one of the angles below, and perpendicular to the middle of the upper side, by which it is connected to the second bone. In other people the point is turned to one side or obliquely forwards or backwards. Frequently it is all nearly of an equal breadth, and in several subjects it is bifurcated;

* Senac. in Memoires de l'acad. des sciences, 1724.

† Σφαγὶς, jugulum, furcula superior.

* Clypealis, gladialis, mucronata, malum granatum, scutum stomachi, epiglottalis, cultralis, medium furculæ inferioris, scutiformis, ensiculata.

whence ſome writers give it the name of *furcella* or *furcula inferior*; or elſe it is unoſſified in the middle. In the greateſt number of adults it is oſſified, and tipped with a cartilage; in ſome one-half of it is cartilaginous, and in others it is all in a cartilaginous ſtate. Generally ſeveral oblique ligaments, fixed at one end to the cartilages of the ribs, and by the other to the outer ſurface of the xiphoid bone, connect it firmly to thoſe cartilages.*

So many different ways this ſmall bone may be formed, without any inconvenience; but then ſome of theſe poſitions may be ſo directed, as to bring on a great train of ill conſequences; particularly, when the lower end is oſſified, and is too much turned outwards or inwards,† or when the conjunction of this appendix with the ſecond bone is too weak.‡

The ſternum is joined by cartilages to the ſeven upper ribs, unleſs when the firſt coaleſces with it in an intimate union of one ſubſtance; and its unequal cavity on each ſide of its upper end is fitted for the ends of the clavicles.

The ſternum moſt frequently has four round ſmall bones, ſurrounded with cartilage, in children born at the full time; the uppermoſt of theſe, which is the firſt bone, being the largeſt. Two or three other very ſmall bony points are likewiſe to be ſeen in ſeveral children. The number of bones increaſes for ſome years, and then diminiſhes, but uncertainly, till they are at laſt united into thoſe above deſcribed of an adult.

The uſes of this bone are, to afford origin and inſertion to ſeveral muſcles; to ſuſtain the mediaſtinum, to defend the vital organs, the heart and lungs, at the fore-part; and, laſtly, by ſerving as a moveable fulcrum of the ribs, to aſſiſt conſiderably in reſpiration; which action, ſo far as it depends on the motion of the bones, we are now at liberty to explain.

When the ribs that are connected by their cartilages to the ſternum, or to the cartilages of the true ribs, are acted upon by the intercoſtal muſcles, they muſt all be pulled from the oblique poſition which their cartilages kept them in, nearer to right angles with the vertebræ and ſternum, becauſe the firſt or uppermoſt rib is by much the moſt fixed of any; and the cartilages making a great reſiſtance to raiſing the anterior ends of the ribs, their large arched middle parts turn outwards as well as upwards. The ſternum, preſſed ſtrongly on both ſides by the cartilages of the ribs, is puſhed forwards, and that at its ſeveral parts, in proportion to the length and motion of its ſupporters, the ribs; that is, moſt at its lower end. The ſternum and the cartilages, thus raiſed forwards, muſt draw the diaphragm connected to them; conſequently ſo far ſtretch it, and bring it nearer to a plane. The power that raiſes this bone and the cartilages, fixes them ſufficiently to make them reſiſt the action of the diaphragm, whoſe fibres contract at the ſame time, and thruſt the viſcera of the abdomen downwards. The arched part of the ribs being thus moved outwards, their anterior ends and the ſternum being advanced forwards, and the diahpragm being brought nearer to a plain ſurface, inſtead of being greatly convex on each ſide within each cavity of the thorax, it is evident how conſiderably the cavity, of which the nine or ten upper ribs are the ſides, muſt be widened, and made deeper and longer. While this is doing in the upper ribs, the lower ones, whoſe cartilages are not joined to the ſternum or to other cartilages, move very differently, though they conſpire to the ſame intention, the enlargement of the thorax; for having no fixed point to which their anterior ends are faſtened, and the diaphragm being inſerted into them at the

* Weitbrecht, Syndeſmolog. p. 121.

† Rolfinc. Diſſert. anat. lib. 2. cap. 41. Paaw de oſſib. part. 1. cap. 3. & part. 3. cap. 3. Codronchi de prolapſu cartilagin. mucronat.

‡ Paaw. ibid. Bortich. act. Hafn. vol. 5. ob. 79. Bonet. Sepulchret. anat. tom. 2. lib. 3. ſect. 5. Append. ad obſ. 8, et. ibid. ſect. 7. obſ. 19.

the place where it runs pretty ſtreight upwards from its origin at the vertebræ, theſe ribs are drawn downwards by this ſtrong muſcle, and by the muſcles of the abdomen, which, at this time, are reſiſting the ſtretching force of the bowels; while the intercoſtal muſcles are pulling them in the contrary direction, to wit, upwards; the effect therefore of either of theſe powers, which are antagoniſts to each other, is very little, as to moving the ribs either up or down; but the muſcles of the abdomen, puſhed at this time outwards by the viſcera, carry theſe ribs along with them. Thus the thorax is not only allowed to be ſhortened, but is really widened at its lower part, to aſſiſt in making ſufficient ſpace for the due diſtenſion of the lungs.

As ſoon as the action of theſe ſeveral muſcles ceaſes, the elaſtic cartilages extending themſelves to their natural ſituation, depreſs the upper ribs, and the ſternum ſubſides; the diaphragm is thruſt by the viſcera abdominalia, and the oblique and tranſverſe muſcles of the belly ſerve to draw the inferior ribs inwards at the ſame time. By theſe cauſes, the cavity of the breaſt is diminiſhed in all its dimenſions.

Though the motions above deſcribed of the ribs and ſternum, eſpecially of the latter bone, are ſo ſmall in the mild reſpiration of a healthy perſon, that we can ſcarce obſerve them; yet they are manifeſt whenever we deſignedly increaſe our reſpiration, or are obliged to do it after exerciſe, and in ſeveral diſeaſes.

OF THE SUPERIOR EXTREMITIES.

AUTHORS are much divided in their opinions about the number of bones which each ſuperior extremity * ſhould be ſaid to conſiſt of, ſome deſcribing the clavicle and ſcapula as part of it, others claſſing theſe two bones with thoſe of the thorax: but ſince moſt quadrupeds have no clavicles, and the human thorax can perform its functions right when the ſcapula is taken away,* whereas it is impoſſible for us to have the right uſe of our arms without theſe bones, I muſt think that they belong to the ſuperior extremities; and therefore ſhall divide each of them into the ſhoulder, arm, fore-arm, and hand.

The *SHOULDER* conſiſts of the clavicle and ſcapula.

CLAVICULA, or *collar-bone*,† is the long crooked bone, in figure like an Italic *ſ*, placed almoſt horizontally between the upper lateral part of the ſternum, and what is commonly called the top of the ſhoulder, which as a clavis, or beam, it bears off from the trunk of the body.

The clavicle as well as other long round bones, is larger at its two ends than in the middle. The end next the ſternum ‡ is triangular; the angle behind is conſiderably produced, to form a ſharp ridge, to which the tranſverſe ligament extended from one clavicle to the other is fixed.§ The ſide oppoſite to this is ſomewhat rounded. The middle of this protuberant end is as irregularly hollowed, as the cavity in the ſternum for receiving it is raiſed; but in a recent ſubject, the irregular concavities of both are ſupplied by a moveable cartilage, which is not only much more cloſely connected every where by ligaments to the circumference of the articulation, than thoſe of the lower jaw are; but it grows to the two bones at both its internal and external ends; its ſubſtance at the internal end being ſoft, but very ſtrong, and reſembling the intervertebral cartilage.‖

From this internal end, the clavicle, for about two-fifths of its length, is bended

* Κωλα, γυα, ἐκφυαδες, Enata, adnata, explantata membra, artus.

* Philoſoph. tranſact. numb. 449. ſect. 5.

† Os jugulare, jugulum, furcula, ligula, clavis, humerus quibuſdam.

‡ Παραφυσις.

§ Riolan. Encheirid. anat. lib. 6. cap. 13. Winſlow, Expoſ. anat. des os frais, ſect 248. Weitbrecht, Act. Petropolit. tom. 4. p. 255. et Syndeſmolog. ſect. 2. i. ſect. 3.

‖ Weitbrecht, Syndeſmolog. ſect. 2. 1. ſect. 5.

bended obliquely forwards and downwards. On the upper and fore part of this curvature a ſmall ridge is ſeen, with a plain rough ſurface before it; whence the muſculus ſterno hyoideus and ſternomaſtoideus have in part their origin. Near the lower angle a ſmall plain ſurface is often to be remarked, where the firſt rib and this bone are contiguous,* and are connected by a firm ligament.† From this a rough plain ſurface is extended outwards, where the pectoral muſcle has part of its origin. Behind, the bone is made flat and rough by the inſertion of the larger ſhare of the ſubclavian muſcle. After the clavicle begins to be bended backwards, it is round, but ſoon after becomes broad and thin; which ſhape it retains to its external end. Along the external concavity, a rough ſinuoſity runs, from which ſome part of the deltoid muſcle takes its riſe: oppoſite to this, on the convex edge, a ſcabrous ridge gives inſertion to a ſhare of the cucullaris muſcle. The upper ſurface of the clavicle here is flat, but the lower is hollow, for lodging the beginning of the muſculus ſubclavius; and towards its back part a tubercle riſes, to which, and a roughneſs near it, the ſtrong ſhort thick ligament connecting this bone to the coracoid proceſs of the ſcapula is fixed.

The external end ‡ of this bone is horizontally oblong, ſmooth, ſloping at the poſterior ſide, and tipped in a recent ſubject with a cartilage, for its articulation with the acromion ſcapulæ. Round this the bone is ſpongy, for the firmer connection of the ligaments.

The medullary arteries, having their direction obliquely outwards, enter the clavicles by one or more ſmall paſſages in the middle of their back part.

The ſubſtance of this bone is the ſame as of the other round long bones.

The triangular unequal interior end of each clavicle, has the cartilage above deſcribed interpoſed betwixt it and the irregular cavity of the ſternum. The ligaments, which ſurround this articulation to ſecure it, are ſo ſhort and ſtrong, that little motion can be allowed any way; and the ſtrong ligament that is ſtretched acroſs the upper furcula of the ſternum, from the ſuperior prominent angle of the one clavicle, to the ſame place of the other clavicle, ſerves to keep each of theſe bones more firmly in their place. By the aſſiſtance, however, of the moveable intervening cartilage, the clavicle can, at this joint, be raiſed or depreſſed, and moved backwards and forwards ſo much, as that the external end, which is at a great diſtance from that axis, enjoys very conſpicuous motions. The articulation of the exterior end of the clavicle ſhall be conſidered after the deſcription of the ſcapula.

The clavicles of infants are not deficient in any of their parts; nor have they any epiphyſes at their extremities joined afterwards to their bodies, as moſt other ſuch long bones have, which preſerves them from being bended too much, and from the danger of any unoſſified parts being ſeparated by the force that pulls the arms forwards.

The uſes of the clavicles are, to keep the ſcapulæ, and conſequently all the ſuperior extremities, from falling in and forward upon the thorax; by which, as in moſt quadrupeds, the motions of the arms would be much confined, and the breaſt made too narrow. The clavicles likewiſe afford origin to ſeveral muſcles, and a defence to large veſſels.

From the ſituation, figure, and uſe of the clavicles, it is evident that they are much expoſed to fractures; that their broken parts muſt generally go by each other; and that they are difficultly kept in their place afterwards.

SCAPULA, or *ſhoulder-blade*,* is the triangular bone ſituated on the outſide

* Dionis, Sixieme demonſt. des os.

† Weitbrecht, Syndeſmolog. ſect. 2. I. ſect. 7.

‡ Ἐπωμὶς.

* Ὠμοπλατος, ἐπινωτιον, latitudo humeri, ſcoptulum vel ſcutulum opertum, ſpatula, ala, humerus, clypeus, ſcutum thoracis.

outside of the ribs, with its longest side, called its *base*, towards the spinal processes of the vertebræ, and with the angle at the upper part of this side about three inches, and the lower angle at a greater distance from these processes. The back part of the scapula has nothing but the thin ends of the serratus anticus major and subscapularis muscles between it and the ribs; but as this bone advances forwards, its distance from the ribs increases. The upper or shortest side, called the *superior costa* of the scapula, is nearly horizontal, and parallel with the second rib. The lower side, which is named the *inferior costa*, is extended obliquely from the third to the eighth rib. The situation of this bone, here described, is when people are sitting or standing in a state of inactivity, and allowing the members to remain in the most natural easy posture. The inferior angle of the scapula is very acute; the upper one is near to a right angle; and what is called the *anterior*, does not deserve the name, for the two sides do not meet to form an angle. The body of this bone is concave towards the ribs, and convex behind, where it has the name of *dorsum*.* Three processes are generally reckoned to proceed from the scapula. The first is the large spine that rises from its convex surface behind, and divides it unequally. The second process stands out from the fore part of the upper side; and, from its imaginary resemblance to a crow's beak, is named *coracoides*.† The third process is the whole thick bulbous fore part of the bone.

After thus naming the several constituent parts of the scapula, the particular description will be understood.

The base, which is tipped with cartilage in a young subject, is not all streight; for above the spine, it runs obliquely forwards to the superior angle; that here it might not be too protuberant backwards, and to bruise the muscles and teguments; into the oblique space the musculus patientiæ is inserted. At the root of the spine, on the back part of the base, a triangular plain surface is formed, by the pressure of the lower fibres of the trapezius. Below this the edge of the scapula is scabrous and rough, for the insertion of the serratus major anticus and the rhomboid muscles.

The back part of the inferior angle is made smooth by the latissimus dorsi passing over it. This muscle also alters the direction of the inferior costa some way forwards from this angle; and so far it is flatted behind by the origin of the teres major. As the inferior costa advances forward, it is of considerable thickness, is slightly hollowed and made smooth behind by the teres minor, while it has a fossa formed into it below by part of the subscapularis; and between the two a ridge with a small depression appears, where the longus extensor cubiti has its origin.

The superior costa is very thin; and near its fore part there is a semilunar niche, from one end of which to the other a ligament is stretched; and sometimes the bone is continued, to form one or sometimes two holes for the passage of the scapular blood-vessels or nerves. Immediately behind this semilunar cavity the coraco hyoid muscle has its rise. From the niche to the termination of the fossa for the teres minor, the scapula is narrower than any where else, and supports the third process. This part has the name of *cervix*.

The whole dorsum of the scapula is always said to be convex; but, by reason of the raised edges that surround it, it is divided into two cavities by the spine, which is stretched from behind forwards, much nearer to the superior than to the inferior costa. The cavity above the spine is really concave where the supra spinatus muscle is lodged; while the surface of this bone below the spine, on which

* Κεφαλίον.

† Anchoroides, sigmoides, digitalis, anciſtroides.

which the infraſpinatus muſcle is placed, is convex, except a foſſa that runs at the ſide of the inferior coſta.

The internal or anterior ſurface of this bone is hollow, except in the part above the ſpine, which is convex. The ſubſcapularis muſcle is extended over this ſurface, where it forms ſeveral ridges and intermediate depreſſions, commonly miſtaken for prints of the ribs; they point out the interſtices of the bundles of fibres of which the ſubſcapularis muſcle is compoſed.*

The ſpine† riſes ſmall at the baſe of the ſcapula, and becomes higher and broader as it advances forwards. On the ſides it is unequally hollowed and crooked, by the actions of the adjacent muſcles. Its ridge ‡ is divided into two rough flat ſurfaces; into the upper one, the trapezius muſcle is inſerted; and the lower one has part of the deltoid fixed to it. The end of the ſpine, called *acromion*,‖ or top of the ſhoulder, is broad and flat, and is ſometimes only joined to the ſpine by a cartilage.§ The anterior edge of the acromion is flat, ſmooth, and covered with a cartilage, for its articulation with the external end of the clavicle; and it is hollowed below, to allow a paſſage to the infra and ſupra ſpinati muſcles, and free motion to the os humeri.

The coracoid ** proceſs is crooked, with its point inclining forwards; ſo that a hollow is left at the lower ſide of its root, for the paſſage of the infraſcapularis muſcle. The end of this proceſs is marked with three plain ſurfaces. Into the internal, the ſerratus minor anticus is inſerted; from the external, one head of the biceps flexor cubiti riſes; and from the lower one, the coracobrachialis has its origin. At the upper part of the root of this proceſs, immediately before the ſemilunar cavity, a ſmooth tubercle appears, where a ligament from the clavicle is fixed. From all the external ſide of this coracoid apophyſe, a broad ligament goes out, which becomes narrower where it is fixed to the acromion. The ſharp pain, violent inflammation, and tedious cure of contuſions in this part, are probably owing to theſe tendons and ligaments being hurt.

From the cervix ſcapulæ the third proceſs is produced. The fore part of this is formed into a glenoid cavity,* which is of the ſhape of the longitudinal ſection of an egg, being broad below, and narrow above. Between the brims of this hollow and the fore part of the root of the ſpine, a large ſinuoſity is left for the tranſmiſſion of the ſupra and infra ſpinati muſcles; and on the upper part of theſe brims we may remark a ſmooth ſurface, where the ſecond head of the biceps flexor cubiti has its origin. The root of the ſupercilia is rough all round, for the firmer adheſion of the capſular ligament of the articulation, and of the cartilage which is placed on theſe brims, where it is thick, but becomes very thin as it is continued towards the middle of the cavity, which it lines all over.

The medullary veſſels enter the ſcapula near the baſe of the ſpine.

The ſubſtance of the ſcapula, as in all other broad flat bones, is cellular, but of an unequal thickneſs; for the neck and third proceſs are thick and ſtrong. The inferior coſta, ſpine, and coracoid proceſs, are of a middle thickneſs; and the body is ſo preſſed by the muſcles, as to become thin and diaphanous.

The ſcapula and clavicle are joined by plain ſurfaces, tipped with cartilage;† by which neither bone is allowed any conſiderable motion, being tightly tied down by the common capſular ligament, and by a very ſtrong

* Winſlow, in Memoires de l'acad. des ſciences, 1722.

† Ραχις, ὑπεροχη ωμοπλατῶν, eminentia ſcapularum.

‡ Pterigium, criſta.

‖ Ἐπωμις, ἀγκυροειδης, κορακοειδης, κατακλεῖς, acromii os, ſummus armus, roſtrum, porcinum, proceſſus digitalis.

§ Sue Trad. d'oſteolog. p. 160.

** Ἀγκυροειδης, Ϛιγμοειδης, roſtriformis.

* Ωμοκότυλις.

† Acromion. κατακλεις, clauſuræ.

one which proceeds from the coracoid process; but divides into two before it is fixed into the clavicle, with such a direction, as either can allow this bone to have a small rotation, in which its posterior edge turns more backwards, while the anterior one rises farther forwards; or it can yield to the fore part of the scapula moving downwards, while the back part of it is drawn upwards; in both which cases, the oblong smooth articulated surfaces of the clavicle and scapula are not in the same plane, but stand a little transversely, or across each other, and thereby preserve this joint from luxations, to which it would be subject, if either of the bones was to move on the other perpendicularly up and down, without any rotation. Sometimes a moveable ligamentous cartilage is found in this joint; otherwhiles such a cartilage is only interposed at the anterior half of it; and in some old subjects I have found a sesamoid bone here.* The scapula is connected to the head, os hyoides, vertebræ, ribs and arm-bone, by muscles, that have one end fastened to these bones, and the other to the scapula, which can move it upwards, downwards, backwards, or forwards; by the quick succession of these motions, its whole body is carried in a circle. But being also often moved as upon an axis perpendicular to its plane, its circumference turns in a circle whose centre this axis is.† Which ever of these motions it performs it always carries the outer end of the clavicle and the arm along with it. The glenoid cavity of this bone receives the os humeri, which plays in it as a ball in a socket, as will be explained more hereafter.

The use of the scapula is, to serve as a fulcrum to the arm; and, by altering its position on different occasions, to allow always the head of the os humeri a right situated socket to move in; and thereby to assist and to enlarge greatly the motions of the superior extremity, and to afford the muscles which rise from it more advantageous actions, by altering their directions to the bone which they are to move. This bone also serves to defend the back part of the thorax, and is often employed to sustain weights; or to resist forces too great for the arm to bear.

The base, acromion, coracoid process, and head of the scapula, are all in a cartilaginous state at birth; and the three first are joined as epiphyses; while the head, with the glenoid cavity, is not formed into a distinct separate bone, but is gradually produced by the ossification of the body of this bone being continued forwards.

The *ARM* has only one bone, best known by the Latin name of *os humeri*;* which is long, round, and nearly streight.

The upper end of this bone † is formed into a large round smooth head, whose middle point is not in a streight line with the axis of the bone, but stands obliquely backwards from it. The extent of the head is distinguished by a circular fossa surrounding its base, where the head is united to the bone, and the capsular ligament of the joint is fixed. Below the fore part of its base two tubercles stand out; the smallest one, which is situated most to the inside, has the tendon of the subscapularis muscle inserted into it. The larger more external protuberance is divided, at its upper part, into three smooth plain surfaces; the anterior of which, the musculus supra spinatus; into the middle or largest, the infra spinatus; into the one behind, the teres minor, is inserted. Between these two tubercles, exactly in the fore part of the bone, a deep long fossa is formed, for lodging the tendinous head of the biceps flexor cubita; which, after passing, in a manner peculiar to itself, through the

* Jac. Sylv. Isagog. anat. lib. 1. cap. 2.

† See Winslow, Memoires de l'acad. des scien.es, 1726.

* Ακρολία, ὠλένη os brachii, armi, adjutorium, parvum brachium, canna brachii.

† Acrocolium.

the cavity of the articulation, is tied down by a tendinous sheath extended across the fossa; in which, and in the neighbouring tubercles, are several holes, which are penetrated by the tendinous and ligamentous fibres, and by vessels. On each side of this fossa, and it descends in the os humeri, a rough ridge, gently flatted in the middle, runs from the roots of the tubercles. The tendon of the pectoral muscle is fixed into the anterior of these ridges, and the latissimus dorsi, and teres major, are inserted into the internal one. A little behind the lower end of this last, another rough ridge may be observed, where the coraco brachialis is inserted. From the back part of the root of the largest tubercle a ridge also is continued, from which the brevis extensor cubiti rises. This bone is flatted on the inside, about its middle, by the belly of the biceps flexor cubiti.

In the middle of this plain surface, the entry of the medullary artery is seen slanting obliquely downwards. At the fore side of this plane the bone rises in a sort of ridge, which is rough and often has a great many small holes in it, where the tendon of the strong deltoid muscle is inserted; on each side of which the bone is smooth and flat, where the brachiœus internus rises. The exterior of these two flat surfaces is the largest; behind it a superficial spiral channel, formed by the muscular nerve and the vessels that accompany it, runs from behind forwards and downwards. The body of the os humeri is flatted behind by the extensors of the fore arm. Near the lower end of this bone, a large sharp ridge is extended on its outside, from which the musculus spinator radii longus, and the longest head of the extensor carpi radialis rise. Opposite to this, there is another small ridge, to which the aponeurotic tendon, that gives origin to the fibres of the internal and external brachiœi muscles, is fixed; and from a little depression on the fore side of it, the pronator radii teres rises.

The body of the os humeri becomes gradually broader towards the lower end, where it has several processes; at the roots of which, there is a cavity before, and another behind.* The anterior is divided by a ridge into two; the external, which is the least, receives the end of the radius; and the internal receives the coronoid process of the ulna in the flexions of the fore arm, while the posterior deep triangular cavity lodges the oleeranon in the extensions of that member. The bone betwixt these two cavities is pressed so thin by the processes of the ulna, as to appear diaphanous in several subjects. The sides of the posterior cavity are stretched out into two processes, one on each side; these are called *condyles*; from each of which a strong ligament goes out to the bones of the fore arm. The external condyle, which has an oblique direction also forwards in respect of the internal, when the arm is in the most natural posture,† is equally broad, and has an obtuse smooth head rising from it forwards. From the rough part of the condyle, the inferior head of the bicornis, the extensor digitorum communis, extensor carpi ulnaris anconœus, and some part of the supinator radii brevis, take their rise; and on the smooth head the upper end of the radius plays. Immediately on the outside of this, there is a sinuosity made by the shorter head of the bicornis muscle, upon which the muscular nerve is placed. The internal condyle is more pointed and protuberant than the external, to give origin to some part of the flexor carpi radialis, pronator radii teres, palmaris longus, flexor digitorum sublimis, and flexor carpi ulnaris. Between the two condyles, is the trochlea, or pully, which consists of two lateral protuberances, and a middle cavity, that are smooth and covered with cartilage. When the fore arm is extended, the tendon of the internal brachiœus muscle is lodged in the fore

* Βαθμίδες.

† Winslow, Memoires de l'acad. des sciences, 1722.

part

part of the cavity of this pulley. The external protuberance, which is less than the other, has a sharp edge behind; but forwards, this ridge is obtuse, and only separated from the little head, already described, by a small fossa, in which the joined edges of the ulna and radius move. The internal protuberance of the pulley is largest and highest; and therefore in the motions of the ulna upon it, that bone would be inclined outwards, was it not supported by the radius on that side. Between this internal protuberance and condyle, a sinuosity may be remarked, where the ulna nerve passes.

The substance and the internal structure of the os humeri is the same, and disposed in the same way as in other long bones.

The round head at the upper end of this bone is articulated with the glenoid cavity of the scapula; which being superficial, and having long ligaments, allows the arm a free and extensive motion. These ligaments are however considerably strong; for, besides the common capsular one, the tendons of the muscles perform the office, and have been described under the name, of *ligaments*. Then the acromion and carocoid process, with the strong broad ligaments stretched betwixt them, secure the articulation above, where the greatest and most frequent force is applied to thrust the head of the bone out of its place. It is true that there is not near so strong a defence at the lower part of the articulation; but in the ordinary postures of the arm, that is, so long as it is in an acute angle with the trunk of the body, there cannot be any force applied at this place to occasion a luxation, since the joint is protected so well above.

The motions which the arm enjoys by this articulation, are to every side; and by the succession of these different motions, a circle may be described. Besides which, the bone performs a small rotation round its own axis. But though this can be performed with the round head in all positions; yet as these vary, the effects upon the body of the bone are very different; for, if the middle of the head is the centre of rotation, as it is when the arm hangs down by the side, the body of the bone is only moved forwards and backwards; because the axis of motion of the head is nearly at right angles with the length of the bone;* whereas, when the arm is raised to right angles with the trunk of the body, the centre of motion, and the axis of the bone, come to be in the same streight line; and therefore the body of the os humeri performs the same motion with its head. Though the motions of the arm seem to be very extensive, yet the larger share of them depends on the motion of the scapula. The lower end of the os humeri is articulated with the bones of the fore arm, and carries them with it in all its motions, but serves as a base on which they perform the motions peculiar to themselves; as shall be described afterwards.

Both the ends of this bone are cartilaginous in a new-born infant, and the large head with the two tuberles, and the trochlea, with the two condyles, become epiphyses, before they are united to the body of the bone.

The *FORE ARM* † consists of two long bones, the ulna and radius; whose situation, in respect of each other, is obliquc in the least straining or most natural posture; that is, the ulna is not directly behind, nor on the outside of the radius, but in a middle situation between these two, and the radius crosses it. The situation however of these two bones, and of all the other bones of the superior extremity that are not yet described, is frequently altered; and therefore, to shun repetitions, I desire it may be now remarked, that, in the remaining account of the superior extremity, I understand by the term of *posterior*, that part which is in the same direction

* Hypocrat. de articul. sect. 1.

† Cubitus, πῆχυς, ὠλένη, πυγών, ulna, lacertus.

with

with the back of the hand; by *anterior*, that answering to the palm; by *internal* that on the same side with the thumb; by *external*, the side nearest to the little finger; supposing the hand always to be in a middle position between pronation and supination.

ULNA,* so named from its being used as a measure, is the longest of the two bones of the fore arm, and situated on the outside of the radius.

At the upper end of the ulna are two processes. The posterior is the largest, and formed like a hook, whose concave surface moves upon the pully of the os humeri, and is called *olecranon*,† or top of the cubit. The convex back part of it is rough and scabrous, where the longus, brevis, and brachiœus externus, are inserted.

The olecranon makes it unnecessary that the tendons of the extensor muscles should pass over the end of the os humeri, which would have been of ill consequence in the great flections of this joint, or when any considerable external force is applied to this part.‡ The anterior process is not so large, nor does it reach so high as the one behind; but is sharper at its end, and therefore is named *coronoid*. Between these two processes, a large semicircular or sigmoid concavity is left; the surface of which, on each side of a middle rising, is slanting, and exactly adapted to the pully of the bone of the arm. Across the middle of it, there is a small sinuosity for lodging mucilaginous glands; where, as well as in a small hollow on the internal side of it, the cartilage that lines the rest of its surface is wanting. Round the brims of this concavity the bone is rough, where the capsular ligament of the joint is implanted. Immediately below the olecranon, on the back part of the ulna, a flat triangular spongy surface appears, on which we commonly lean. At the internal side of this, there is a larger hollow surface, where the musculus anconœus is lodged; and the ridge at the inside of this gives rise to the musculus supinator radii brevis. Between the top of the ridge and the coronoid process is the semilunated smooth cavity, lined with cartilage, in which, and a ligament extended from the one to the other end of this cavity, the round head of the radius plays. Immediately below it a rough hollow gives lodging to mucilaginous glands. Below the root of the coronoid process, this bone is scabrous and unequal, where the brachiœus internus is inserted. On the outside of that we observe a smooth concavity, where the beginning of the flexor digitorum profundus sprouts out.

The body of the ulna is triangular. The internal angle is very sharp where the ligament that connects the two bones is fixed; the sides which make this angle, are flat and rough, by the action and adhesion of the many muscles which are situated here. At the distance of one third of the length of the ulna from the top, in its fore part, the passage of the medullary vessels is to be remarked slanting upwards. The external side of this bone is smooth, somewhat convex, and the angles at each edge of it are blunted by the pressure of the muscles equally disposed about them.

As this bone descends, it becomes gradually smaller; so that its lower end terminates in a little head, standing on a small neck. Towards the fore but outer part of which last, an oblique ridge runs, that gives rise to the pronator radii quadratus. The head is round, smooth, and covered with a cartilage on its internal side, to be received into the semilunar cavity of the radius; while a styloid process† rises from its outside, to which is fixed a strong ligament that is extended to the os cuneiforme and pisiforme of the wrist. Between the back part of the internal smooth side and

* Cubitus, πῆχυς, πρεπῆχιον, fecile majus, canna vel arundo major, et inferior brachii.

† Ἀγκών, gibber cubitus, additamentum necatum.

‡ Winslow, Exposition anatomique du corps humain, traite des os secs, sect. 979.

† Τραχηλός, malleolus externus.

and this proceſs, a ſinuoſity is left for the tendon of the extenſor carpi ulnaris. On the fore part of the root of the proceſs, ſuch another depreſſion may be remarked for the paſſage of the ulnar artery and nerve. The end of the bone is ſmooth, and covered with a cartilage. Between it and the bones of the wriſt, a doubly-concave moveable cartilage is interpoſed; which is a continuation of the cartilage that covers the lower end of the radius, and is connected looſely to the root of the ſtyloid proceſs, and to the rough cavity there; in which mucilaginous glands are lodged.

The ulna is articulated above with the lower end of the os humeri, where theſe bones have depreſſions and protuberances correſponding to each other ſo as to allow an eaſy and ſecure extenſion of the fore arm to almoſt a ſtreight line with the arm, and flection to a very acute angle; but, by the ſlanting poſition of the pully, the lower part of the fore arm is turned outwards in the extenſion, and inwards in the flection;* and a very ſmall kind of rotation is likewiſe allowed in all poſitions, eſpecially when the ligaments are moſt relaxed by the fore arm being in a middle degree of flection. The ulna is alſo articulated with the radius and corpus in a manner to be related afterwards.

RADIUS,† ſo called from its imagined reſemblance to a ſpoke of a wheel, or to a weaver's beam, is the bone placed at the inſide of the fore arm. Its upper end is formed into a circular head, which is hollowed for an articulation with the tubercle at the ſide of the pulley of the os humeri; and the half of the round circumference of the head next to the ulna is ſmooth, and covered with a cartilage, in order to be received into the ſemilunated cavity of that bone. Below the head, the radius is much ſmaller; therefore this part is named its cervix, which is made round by the action of the ſupinator radii brevis. At the external root of this neck, a tuberous proceſs riſes; into the outer part of which the biceps flexer cubiti is inſerted. From this a ridge runs downwards and inwards, where the ſupinator radii brevis is inſerted; and a little below, and behind this ridge, there is a rough ſcabrous ſurface, where the pronator radii teres is fixed.

The body of the radius is not ſtreight, but convex on its internal and poſterior ſurfaces; where it is alſo made round by the equal preſſure of the circumjacent muſcles, particularly of the extenſors of the thumb; but the ſurfaces next to the ulna are flatted and rough, for the origin of the muſcles of the hand; and both terminate in a common ſharp ſpine, to which the ſtrong ligament extended betwixt the two bones of the fore arm is fixed. A little below the beginning of the plain ſurface, on its fore part, where the flexor muſcle of the laſt joint of the thumb takes its origin, the paſſage of the medullary veſſels is ſeen ſlanting upwards. The radius becomes broader and flatter towards the lower end, eſpecially on its fore part, where its pronator quadratus muſcle is ſituated.

The lower end of the radius is larger than the ſuperior; though not in ſuch a diſproportion as the upper end of the ulna is larger than its lower end. Its back part has a flat ſtrong ridge in the middle, and foſſæ on each ſide. In a ſmall groove immediately on the outſide of the ridge, the tendon of the extenſor tertii internodii policis plays. In a large one beyond this, the tendons of the indicator and of the common extenſor muſcles of the fingers paſs. Contiguous to the ulna, there is a ſmall depreſſion made by the extenſor minimi digiti. On the inſide of the ridge there is a broad depreſſion, which ſeems again ſubdivided, where the two tendons of the bicornis, or extenſor carpi radialis, are lodged. The internal ſide of this end of the radius is alſo hollowed by

* Winſlow, Memoires de l'acad. des ſciences, 1722.

† Κερχις, παραπήχιον, focile minus, canna minor, arundo minor.

by the extensors of the first and second joint of the thumb; immediately above which, a little rough surface shews where the spinator radii longus is inserted. The ridges at the sides of the grooves, in which the tendons play, have an angular ligament fixed to them, by which the several sheaths for the tendons are formed. The fore part of this end of the radius is also depressed, where the flexors of the fingers and flexor carpi radialis pass. The external side is formed into a similunated smooth cavity, lined with a cartilage, for receiving the lower end of the ulna. The lowest part of the radius is formed into an oblong cavity; in the middle of which is a small transverse rising, gently hollowed, for lodging mucilaginous glands; while the rising itself is insinuated into the conjunction of the two bones of the wrist that are received into the cavity. The internal side of this articulation is fenced by a remarkable process * of the radius, from which a ligament goes out to the wrist, as the styloid process of the ulna with its ligament guards it on the outside.

The ends of both the bones of the fore arm being thicker than the middle, there is a considerable distance between the bodies of these bones; in the larger part of which a strong tendinous, but thin ligament, is extended, to give a large-enough surface for the origin of the numerous fibres of the muscles situated here, that are so much sunk between the bones, as to be protected from injuries, which they would otherwise be exposed to. But this ligament is wanting near the upper end of the fore arm, where the supinator radii brevis, and flexor digitorum profundus, are immediately connected.†

Both ends of the bones of the fore arm are first cartilages, and then epiphyses in children.

As the head of the radius receives the tubercle of the os humeri, it is not only bended and extended along with the ulna, but may be moved round its axis in any position; and that this motion round its axis may be sufficiently large, the ligament of the articulation is extended farther down than ordinary on the neck of this bone, before it is connected to it; and it is very thin at its upper and lower part, but makes a firm ring in the middle. This bone is also joined to the ulna by a double articulation; for above, a tubercle of the radius plays in a socket of the ulna, whilst below, the radius gives the socket, and the ulna the tubercle; but then the motion performed in these two is very different; for at the upper end, the radius does no more than turn round its axis; while at the lower end, it moves in a sort of cycloid upon the round part of the ulna; and as the hand is articulated and firmly connected here with a radius, they must move together. When the palm is turned uppermost, the radius is said to perform the supination; when the back of the hand is above, it is said to be prone. But then the quickness and large extent of these two motions are assisted by the ulna, which, as was before observed, can move with a kind of small rotation on the sloping sides of the pulley. This lateral motion, though very inconsiderable in the joint itself, is conspicuous at the lower end of such a long bone; and the strong ligament connecting this lower end to the carpus, makes the hand more readily to obey these motions. When we design a large circular turn of our hand, we increase it by the rotation of the os humeri, and sometimes employ the spine and inferior extremities to make these motions of pronation or supination of the hand large enough.

The *HAND** comprehends all from the joint of the wrist to the points of the fingers. Its back part is convex, for greater firmness and strength; and it is concave before, for containing more surely and conveniently such

* Malleolus internus, processus styloides.

† Weitbrecht, Syndesmolog. sect. 10, 11.

* Ἀκρόχειρ, summa manus.

bodies

bodies as we take hold of. One half of the hand has an obscure motion in comparison of what the other has, and serves as a base to the moveable half; which can be extended back very little farther than to a streight line with the fore arm, but can be considerably bended forwards.

As the bones that compose the hand are of different shapes and uses, while several of them that are contiguous agree in some general characters; the hand is, on this account, commonly divided into the carpus, metacarpus, and fingers; among which last the thumb is reckoned.

The *CARPUS** is composed of eight small spongy bones, situated at the upper part of the hand. I shall describe each of these bones under a proper name taken from their figure;† because the method of ranging them by numbers leaves anatomists too much at liberty to debate very idly, which ought to be preferred to the first number; or, which is worse, several, without explaining the order they observe, differently apply the same, numbers and so confound their readers. But that the description of these bones may be in the same order as they are found in the generality of anatomical books, I shall begin with the range of bones that are concerned in the moveable joint of the wrist, or are connected to the fore arm, and shall afterwards consider the four that support the thumb and ossa metacarpi of the fingers.

The eight bones of the carpus are, os scaphoides, lunare, cuneiforme, pisiforme, trapezium, trapezoides, magnum, unciforme.

The scaphoides is situated most internally of those that are articulated with the fore arm. The lunare is immediately on the outside of the former. The cuneiforme is placed still more externally, but does not reach so high up as the other two. The pisiforme stands forwards into the palm from the cuneiforme. The trapezium is the first of the second row, and is situated betwixt the scaphoides and first joint of the thumb. The trapezoides is immediately on the outside of the trapezium. The os magnum is still more external. The unciforme is farther to the inside of the little finger.

Os scaphoides* is the largest of the eight except one. It is convex above, concave and oblong below; from which small resemblance of a boat it has got its name. Its smooth convex surface is divided by a rough middle fossa, which runs obliquely across it. The upper larger division is articulated with the radius. Into the fossa the common ligament of the joint of the wrist is fixed; and the lower division is joined to the trapezium and trapezoides. The concavity receives more than an half of the round head of the os magnum. The external side of this hollow is formed into a semilunar plane, to be articulated with the following bone. The internal, posterior, and anterior edges are rough, for fixing the ligaments that connect it to the surrounding bones.

Os lunare† has a smooth convex upper surface, by which it is articulated with the radius. The internal side, which gives the name to the bone, is in the form of a crescent, and is joined with the scaphoid; the lower surface is hollow, for receiving part of the head of the os magnum. On the outside of this cavity is another smooth but narrow oblong sinuosity, for receiving the upper end of the os unciforme; on the outside of which a small round convexity is found, for its connection with the os cuneiforme. Between the great convexity above, and the first deep inferior cavity, there is a rough fossa, in which the circular ligament of the joint of the wrist is fixed.

Os cuneiforme‡ is broader above, and

* Κτεις, brachiale, prima palmæ pars, rasetta.

† Lyser. Cult. anat. lib. 5. cap. 2.

* Κοτυλοειδες, naviculare.

† Lunatum.

‡ Triquetrum.

and towards the back of the hand, than it is below and forwards; which gives it the resemblance of a wedge. The superior slightly-convex surface is included in the joint of the wrist, being opposed to the lower end of the ulna.

Below this the cuneiform bone has a rough fossa, wherein the ligament of the articulation of the wrist is fixed. On the internal side of this bone, where it is contiguous to the os lunare, it is smooth and slightly concave. Its lower surface, where it is contiguous to the os unciforme is oblong, somewhat spiral, and concave. Near the middle of its anterior surface a circular plane appears, where the os pisiforme is sustained.

Os pisiforme* is almost spherical, except one circular plane, or slightly hollow surface, which is covered with cartilage for its motion on the cuneiform bone, from which its whole rough body is prominent forwards into the palm; having the tendon of the flexor carpi ulnaris, and a ligament from the styloid process of the ulna, fixed to its upper part; the transverse ligament of the wrist is connected to its internal side; ligaments extended to the unciform bone, and to the os metacarpi of the little finger, are attached to its lower part; the abductor minimi digiti has its origin from its fore part; and, at the internal side of it, a small depression is formed, for the passage of the ulnar nerve.

Trapezium † has four unequal sides and angles in its back part, from which it has got its name. Above, its surface is smooth, slightly hollowed, and semicircular, for its conjunction with the os scaphoides. Its external side is an oblong concave square, for receiving the following bone. The inferior surface is formed into a pulley; the two protuberant sides of which are external and internal. On this pulley the first bone of the thumb is moved. At the external side of the external protuberance, a small oblong smooth surface is formed by the os metacarpi indicis. The fore part of the trapezium is prominent in the palm, and, near to the external side, has a sinuosity in it, where the tendon of the flexor carpi radialis is lodged; on the ligamentous sheath of which the tendon of the flexor tertii internodii pollicis plays; and still more externally the bone is scabrous, where the transverse ligament of the wrist is connected, the abductor and flexor primi internodii pollicis have their origin, and ligaments go out to the first bone of the thumb.

Os trapezoides,* so called from the irregular quadrangular figure of its back part, is the smallest bone of the wrist, except the pisiforme. The figure of it is an irregular cube. It has a small hollow surface above, by which it joins the scaphoides; a long convex one internally, where it is contiguous to the trapezium; a small external one, for its conjunction with the os magnum; and an inferior convex surface, the edges of which are however so raised before and behind, that a sort of pulley is formed, where it sustains the os metacarpi indicis.

Os magnum,† so called because it is the largest bone of the carpus, is oblong, having four quadrangular sides, with a round upper end, and a triangular plain one below. The round head is divided by a small rising, opposite to the connection of the os scaphoides and lunare, which together form the cavity for receiving it. On the inside a short plain surface joins the os magnum to the trapezoides. On the outside is a long narrow concave surface, where it is contiguous to the os unciforme. The lower end, which sustains the metacarpal bone of the middle finger, is triangular, slightly hollowed, and farther advanced on the internal side than on the external, having a considerable oblong depression made on the advanced

* Cartilaginosum, subrotundum, rectum.
† Os cubiforme, trapezoides, multangulum, majus.

* Trapezium, multangulum minus.
† Maximum, capitatum.

vanced inside by the metacarpal bone of the fore-finger; and generally there is a small mark of the os metacarpi digiti annularis on its external side.

Os unciforme* has got its name from a thin broad process that stands out from it forwards into the palm, and is hollow on its inside, for affording passage to the tendons of the flexors of the fingers. To this process also the transverse ligament is fixed, that binds down and defends these tendons; and the flexor and abductor muscles of the little finger have part of their origin from it. The upper plain surface is small, convex, and joined with the os lunare; the internal side is long, and slightly convex, adapted to the contiguous os magnum; the external surface is oblique, and irregularly convex, to be articulated with the cuneiform bone; the lower end is divided into two concave surfaces; the external is joined with the metacarpal bone of the little finger, and the internal one is fitted to the metacarpal bone of the ring-finger.

In the description of the preceding eight bones, I have only mentioned those plain surfaces covered with cartilage, by which they are articulated to each other, or to some other bones, except in some few cases, where something extraordinary was to be observed; and I have designedly omitted the other rough surfaces, lest, by crowding too many words in the description of such small bones, the whole should be unintelligible: but these scabrous parts of the bones may easily be understood, after mentioning their figure, if it is observed, that they are generally found only towards the back or palm of the hand; that they are all plain, larger behind than before; and that they receive the different ligaments, by which they are either connected to neighbouring bones, or to one another; for these ligaments cover all the bones, and are so accurately applied to them, that, a first view, the whole carpus of a recent subject appears one smooth bone.*

As the surfaces of these bones are largest behind, the figure of the whole conjoined must be convex there, and concave before; which concavity is still more increased by the os pisiforme, and process of the os unciforme, standing forwards on one side, as the trapezium does on the other; and the bones are securely kept in this form, by the broad strong transverse ligament connected to those parts that stand prominent into the palm of the hand. The convexity behind renders the whole fabric stronger, where it is most exposed to injuries; and the large anterior hollow is necessary for a safe passage to the numerous vessels, nerves, and tendons of the fingers.

The substance of these bones is spongy and cellular, but strong in respect of their bulk.

The three first bones of the carpus make an oblong head, by which they are articulated with the cavity at the lower ends of the bones of the fore arm; so as to allow motion to all sides, and, by a quick succession of these motions, they may be moved in a circle. But as the joint is oblong, and therefore the two dimensions are unequal, no motion is allowed to the carpus round its axis, except what it has in the pronation and supination along with the radius. The articulation of the first three bones of the inferior, is such as allows of motion, especially backwards and forwards; to the security and easiness of which, the reception of the os magnum into the cavity formed by the scaphoides and lunare, contributes considerably; and the greatest number of the muscles that serve for the motion of the wrist on the radius, being inserted beyond the conjunction of the first row of bones with the second, act equally on this articulation as they do on the former; but the joint formed with the

* Cuneiforme.

* Galen. de usu part. lib. 2. cap. 8. For a particular description of these ligaments, see Weitbrecht. Syndesmolog. p. 5, 68.

radius being the moſt eaſily moved, the firſt effect of theſe muſcles is on it; and the ſecond row of the carpus is only moved afterwards. By this means a larger motion of the wriſt is allowed, than otherwiſe it could have had ſafely; for, if as large motion had been given to one joint, the angle of flection would have been very acute, and the ligaments muſt have been longer than was conſiſtent with the firmneſs and ſecurity of the joint. The other articulations of the bones here being by nearly plain ſurfaces, ſcarce allow of any more motion, becauſe of the ſtrong connecting ligaments, than to yield a little, and ſo elude the force of any external power; and to render the back of the wriſt a little more flat, or the palm more hollow, on proper occaſions. The articulations of the thumb and metacarpal bones ſhall be examined afterwards.

The uſes of the carpus are to ſerve as a baſe to the hand, to protect its tendons, and to afford it a free large motion.

All the bones of the carpus are in a cartilaginous ſtate at the time of birth.

On account of the many tendons that paſs upon the lower end of the fore arm and the carpus, and of the numerous ligaments of theſe tendons and of the bones, which have lubricating liquors ſupplied to them, the pain of ſprains here is acute, the parts take long time to recover their tone, and their ſwellings are very obſtinate.

*METACARPUS** conſiſts of four bones which ſuſtain the fingers. Each bone is long and round, with its ends larger than its body. The upper end, which ſome call the baſe, is flat and oblong, without any conſiderable head or cavity; but it is however ſomewhat hollowed, for the articulation with the carpus; it is flat and ſmooth on the ſides where theſe bones are contiguous to each other. Their bodies are flatted on their back part by the tendons of the extenſors of the fingers. The anterior ſurface of theſe bodies is a little concave, eſpecially in their middle; along which a ſharp ridge ſtands out, which ſeparates the muſculi interoſſei placed on each ſide of theſe bones, which are made flat and plain by theſe muſcles.

Their lower ends are raiſed into large oblong ſmooth heads, whoſe greateſt extent is forwards from the axis of the bone. At the fore part of each ſide of the root of each of theſe heads, one or two tubercles ſtand out, for fixing the ligaments that go from one metacarpal bone to another, to preſerve them from being drawn aſunder; round the heads a rough ring may be remarked, for the capſular ligaments of the firſt joints of the fingers to be fixed to; and both ſides of theſe heads are flat by preſſing on each other.

The ſubſtance of the metacarpal bones is the ſame with that of all long bones.

At the time of birth, theſe bones are cartilaginous at both ends, which afterwards become epiphyſes.

The metacarpal bones are joined above to the oſſa carpi and to each other by nearly plain ſurfaces. Theſe connections are not fit for large motions. The articulation of their round heads at the lower ends with the cavities of the firſt bones of the fingers, is to be taken notice of hereafter.

The concavity on the fore part of theſe metacarpal bones, and the placing their baſes on the arched carpus, cauſe them to form a hollow in the palm of the hand, which is uſeful often to us. The ſpaces between them lodge muſcles, and their ſmall motion makes them fit ſupporters for the fingers to play on.

Though the oſſa metacarpi ſo far agrees, yet they may be diſtinguiſhed from each other by the following marks:

The os metacarpi indicis is generally the longeſt. Its baſe, which is articulated

† Κτεις, προκαρπιον, Ὤθος, ἀνδηρον, κτενιον, poſtbrachiale, pectus, palma, pecten.

ticulated with the os trapezoides, is hollow in the middle. The small ridge on the internal side of this oblong cavity is smaller than the one opposite to it, and is made flat on the side by the trapezium. The exterior ridge is also smooth, and flat on its outside, for its conjunction with the os magnum; immediately below which, a semicircular smooth flat surface shews the articulation of this to the second metacarpal bone. The back part of this base is flatted, where the long head of the extensor carpi radialis is inserted; and its fore part is prominent, where the tendon of the flexor carpi radialis is fixed. The external side of the body of this bone is more hollowed by the action of muscles than the internal. The tubercle at the internal root of its head is larger than the external. Its base is so firmly fixed to the bone it is connected with, that it has no motion.

Os metacarpi medii digiti is generally the second in length; but often it is as long as the former; sometimes it is longer; and frequently it appears only to equal the first by the os magnum being farther advanced downwards than any other bone of the wrist. Its base is a broad superficial cavity, slanting outwards; the internal posterior angle of which is so prominent, as to have the appearance of a process. The internal side of this base is made plain in the same way as the external side of the former bone, while its external side has two hollow circular surfaces, for joining the third metacarpal bone, and between these surfaces there is a rough fossa, for the adhesion of a ligament, and lodging mucilaginous glands. The shorter head of the bicornis is inserted into the back part of this base. The two sides of this bone are almost equally flatted; only the ridge on the fore part of the body inclines outwards. The tubercles at the fore part of the root of the head are equal. The motion of this bone is very little more than the first metacarpal one has; and therefore these two firmly resist bodies pressed against them by the thumb, or fingers, or both.

Os metacarpi digiti annularis is shorter than the second metacarpal bone. Its base is semicircular and convex, for its conjunction with the os uneiforme. On its internal side are two smooth convexities, and a middle fossa, adapted to the second metacarpal bone.

The external side has a triangular smooth concave surface to join it with the fourth one. The anterior ridge of its body is situated more to the out than to the inside. The tubercles near the head are equal. The motion of this third metacarpal bone is greater than the motion of the second.

Os metacarpi minimi digiti is the smallest and sharpest. Its base is irregularly convex, and rises slanting outwards. Its internal side is exactly adapted to the third metacarpal bone. The external has no smooth surface, because it is not contiguous to any other bone; but it is prominent where the extensor carpi ulnaris is inserted. As this metacarpal bone is furnished with a proper moving muscle, has the plainest articulation, is most loosely connected and least confined, it not only enjoys a much larger motion than any of the rest, but draws the third bone with it, when the palm of the hand is to be made hollow by its advancement forwards, and by the prominence of the thumb opposite to it.

The *THUMB* and four *FINGERS* are each composed of three long bones.

The thumb * is situated obliquely in respect of the fingers, neither opposite directly to them, nor in the same plane with them. All its bones are much thicker and stronger in proportion to their length, than the bones of the fingers are; which was extremely necessary, since the thumb counteracts all the fingers.

The first bone of the thumb has its base adapted to the double pulley of

† Αντίχειρ, δικονδυλός, magnus digitus, promanus.

the trapezium; for, in viewing it from one side to the other, it appears convex in the middle; but when considered from behind forwards, it is concave there. The edge at the fore part of this base is produced farther than any other part; and round the back part of the base a rough fossa may be seen, for the connection of the ligaments of this joint. The body and head of this bone are of the same shape as the ossa metacarpi; only that the body is shorter, and the head flatter, with the tubercles at the fore part of its root larger.

The articulation of the upper end of this bone is uncommon; for though it has protuberances and depressions adapted to the double pulley of the trapezium, yet it enjoys a circular motion, as the joints do where a round head of one bone plays in the orbicular socket of another; only it is somewhat more confined and less expeditious, but stronger and more secure, than such joints generally are.

This bone of children is in the same state with the metacarpal bone.

The second bone of the thumb has a large base formed into an oblong cavity, whose greatest length is from one side to the other. Round it several tubercles may be remarked, for the insertion of ligaments. Its body is convex, or a half round behind, but flat before, for lodging the tendon of the long flexor of the thumb; which is tied down by ligamentous sheaths that are fixed on each side to the angle at the edge of this flat surface. The lower end of this second bone has two lateral round protuberances, and a middle cavity, whose greatest extent of smooth surface is forwards.

The articulation and motion of the upper end of this second bone is as singular as that of the former. For its cavity being joined to the round head of the first bone, it would seem at first view to enjoy motion in all directions; yet, because of the strength of its lateral ligaments, oblong figure of the joint itself, and mobility of the first joint, it only allows flection and extension; and these are generally much confined.

The third bone of the thumb is the smallest, with a large base, whose greatest extent is from one side to the other. The base is formed into two cavities and a middle protuberance, to be adapted to the pulley of the former bone. Its body is rounded behind; but is flatter than in the former bone for sustaining the nail. It is flat and rough before, by the insertion of the flector. tertii internodii. This bone becomes gradually smaller, till near the lower end, where it is a little enlarged, and has an oval scabrous edge.

The motion of this third bone is confined to flection and extension.

The orderly disposition of the bones of the fingers into three rows, has made them generally obtain the name of three *phalanges*.* All of them have half round convex surfaces, covered with an aponeurosis, formed by the tendons of the extensors, lumbricales, and interossei, and placed directly backwards, for their greater strength, and their flat concave part is forwards, for taking hold more surely, and for lodging the tendons of the flexor muscles. The ligaments for keeping down these tendons are fixed to the angles that are between the convex and concave sides.

The bones of the first phalanx † of the fingers answer to the description of the second bone of the thumb; only that the cavity in their base is not so oblong; nor is their motion on the metacarpal bones so much confined; for they can be moved laterally or circularly, but have no rotation, or a very small degree of it, round their axis.

Both the ends of this first phalanx are in a cartilaginous state at the birth; and the upper one is afterwards affixed in form of an epiphyse.

The second bone ‡ of the fingers

* Scytalidæ, internodia, scuticula, agmina, acies, condyli articuli.

† Προκοιδυλοι.

‡ Κοιδυλοι.

has

has its base formed into two lateral cavities, and a middle protuberance; while the lower end has two lateral protuberances and a middle cavity; therefore it is joined at both ends in the same manner, which none of the bones of the thumb are.

This bone is in the same condition with the former in children.

The third bone * differs nothing from the description of the third bone of the thumb excepting in the general distinguishing marks; and therefore the second and third phalanx of the fingers enjoy only flection and extension.

The upper end of this third phalanx is a cartilage in a ripe child; and is only an epiphyse after, till the full growth of the body.

All the difference of the phalanges of the several fingers consists in their magnitude. The bones of the middle finger† being the longest and largest; those of the fore finger ‡ come next to that in thickness, but not in length, for those of the ring-finger ‖ are a little longer. The little finger § has the smallest bones. Which disposition is the best contrivance for holding the largest bodies; because the longest fingers are applied to the middle largest periphery of such substances as are of a spherical figure.**

The uses of all the parts of our superior extremities are so evident in the common actions of life, that it is needless to enumerate them here; and therefore I shall proceed to the last part of the skeleton. Only, lest I should seem to have forgot the small bones at the joints of the hand, I desire now to refer to the description of them, under the common title of *sesamoid bones*, which I have placed after the bones of the feet.

* Μετακονδυλοι, ριζανυχια.

† Καταπυγων, οφακκελος, infamis, impudicus, verpus, famosus, obscænus.

‡ Δεατικος, indicator, λιχανος, demonstrativus, salutaris.

‖ Ἰατρικος, παραμεσος, δακτυλιωτης, επιβατης, annularis, medicus, medius, digitus.

§ Μυοψ, ωτιτης, auricularis, minimus.

** Galen de usu part. lib. 1. cap. 24.

OF THE INFERIOR EXTREMITIES.

THE *INFERIOR EXTREMITIES* depend from the acetabula of the ossa innominata; are commonly divided into three parts, viz. the thigh, leg, and foot.

The *THIGH** has only one bone; which is the longest of the body, and the largest and strongest of any of the cylindrical bones. The situation of it is not perpendicular; for the lower end of it is inclined considerably inwards; so that the knees are almost contiguous, while there is a considerable distance between the thigh-bones above; which is of good use to us, since sufficient space is thereby left for the external parts of generation, the two great cloacæ of urine and fæces, and for the large thick muscles that move the thigh inwards; and at the same time this situation of the thigh-bones renders our progression quicker, surer, streighter, and in less room; for had the knees been at a greater distance from each other, we must have been obliged to describe some part of a circle with the trunk of our body in making a long step, and, when one leg was raised from the ground, our centre of gravity would have been too far from the base of the other, and we should consequently have been in hazard of falling; so that our steps would neither have been streight nor firm; nor would it have been possible to walk in a narrow path, had our thigh-bones been otherwise placed. In consequence, however, of the weight of the body bearing so obliquely on the joint of the knee, by this situation of the thigh-bones, weak ricketty children become in-kneed.

The upper end of the thigh-bone is not continued in a streight line with the body of it, but is set off obliquely inwards and upwards, whereby the distance here between these two bones at their upper part is considerably increased. This end is formed into a large smooth round head,† which is

* Μηρον, femen, coxa, agis, anchæ os, crus, femur.

* Vertebrum.

the

the greater proportion of a sphere unequally divided. Towards its lower internal part a round rough spongy pit is observable, where the strong ligament, commonly, but unjustly, called the *round* one, is fixed, to be extended from thence to the lower internal part of the receiving cavity, where it is considerably broader than near to the head of the thigh-bone. The small part below the head, called the *cervix*, of the os femoris, has a great many holes, into which the fibres of the strong ligament, continued from the capsular, enter, and are thereby surely united to it; and round the root of the neck, where it rises from the bone, a rough ridge is found, where the capsular ligament of the articulation itself is connected. Below the back part of this root, the large unequal protuberance, called *trochanter major*,* stands out; the external convex part of which is distinguished into three different surfaces, whereof the one on the fore part is scabrous and rough, for the insertion of the glutæus minimus; the superior one is smooth, and has the glutæus medius inserted into it; and the one behind is flat and smooth by the tendon of the glutæus maximus passing over it. The upper edge of this process is sharp and pointed at its back part, where the glutæus medius is fixed; but forwards it is more obtuse, and has two superficial pits formed in it; into the superior of these, the piriformis is implanted; and the obturator internus and gemini are fixed into the lower one. From the backmost prominent part of this great trochanter, a rough ridge runs backwards and downwards, into which the quadratus is inserted. In the deep hollow, at the internal upper side of this ridge, the obturator externus is implanted. More internally, a conoid process, called *trochanter minor*,† rises for the insertion of the musculus psoas, and iliacus internus, and the pectineus is implanted into a rough hollow below its internal root. The muscles inserted into these two processes being the principal instruments of the rotatory motion of the thigh, have occasioned the name of *trochanters* to the processes. The tendons that are fixed into or pass over the great trochanter, cause bruises by falls on this part to be attended with great pain and weakness of the limb, which generally remain long.

The body of the os femoris is convex on the fore part, and made hollow behind by the action of the muscles that move it and the leg, for the conveniency of sitting, without bearing too much on these muscles; and probably the weight of the legs depending from the thighs in that posture contributes to this curvature. The fore part of the thigh bone is a little flatted above by the beginning of the cruræus muscle, as it is also below by the same muscle and the rectus. Its external surface is likewise made flat below by the vastus externus, where it is separated from the former by an obtuse ridge. The vastus internus depresses a little the lower part of the internal surface. The posterior concave surface has a ridge rising in its middle, commonly called the *linea aspera*, into which the triceps is inserted, and the short head of the biceps flexor tibiæ rises from it. At the upper part of it the medullary vessels enter by a small hole that runs obliquely upwards. A little above which there is a rough fossa or two, where the tendon of the glutæus maximus is fixed. The lower end of the linea aspera divides into two, which descend towards each side. The two vasti muscles have part of their origin from these ridges; and the long tendon of the triceps is fixed to the internal, by means of part of the fascia aponeurotica of the thigh. Near the beginning of the internal ridge, there is a discontinuation of the ridge, where the crural artery passes through the aponeurosis. Between these two rough lines, the bone is made flat by the large blood-vessels and nerves which

* Γλουτός, rotator nat's, malum, granatum testiculorum.

† Rotator minor.

which pafs upon it; and near the end of each of thefe ridges, a fmall fmooth protuberance may often be remarked, where the two heads of the external gaftrocnemius mufcle take their rife, and where fefamoid bones are fometimes found;* and from the fore part of the internal tubercle, a ftrong ligament is extended to the infide of the tibia.

The lower end of the os femoris is larger than any other part of it, and is formed into a great protuberance on each fide, called its *condyles*; between which a confiderable cavity is found, efpecially at the back part, in which the crural veffels and nerves lie immerfed in fat. The internal condyle is longer than the external, which muft happen from the oblique pofition of this bone, to give lefs obliquity to the leg. Each of thefe proceffes feems to be divided in its plain fmooth furface. The mark of divifion on the external is a notch, and on the internal a fmall protuberance. The fore part of this divifion, on which the rotula moves, is formed like a pulley, the external fide of which is higheft. Behind, there are two oblong large heads, whofe greateft extent is backwards, for the motion of the tibia; and from the rough cavity between them, but near to the bafe of the internal condyle, the ftrong ligament commonly, called the *crofs* one, has its rife. A little above which a rough protuberance gives infertion to the tendon of the triceps. The condyles, both on the outer and inner fide of the knee are made flat by the mufcles paffing along them. On the back part of the internal, a flight depreffion is made by the tendons of the gracilis and fartorius; and on the external fuch another is formed by the biceps flexor cruris; behind which a deep foffa is to be obferved, where the poplitæus mufcle has its origin. From the tubercle immediately before this cavity, a ftrong round ligament goes out to the upper part of the fibula.

* Vefal. lib. 1. cap. 28. & 30.

Round this lower end of the thigh-bone, large holes are found, into which the ligaments for the fecurity of the joint are fixed, and the blood-veffels pafs to the internal fubftance of the bone.

The thigh-bone being articulated above with the acetabulum of the offa innominata, which affords its round head a fecure and extenfive play, can be moved to every fide; but is reftrained in its motion outwards, by the high brims of the cavity, and by the round ligament; for otherwife the head of the bone would have been frequently thruft out at the breach of the brims on the infide, which allows the the thigh to move confiderably inwards. The body of this bone enjoys little or no rotatory motion, though the head moft commonly moves round its own axis, becaufe the oblique progrefs of the neck and head from the bone is fuch, that the rotatory motion of the head can only bring the body of the bone forwards and backwards; nor is this head, as in the arm, ever capable of being brought to a ftreight direction with its body; fo far however as the head can move within the cavity backwards and forwards, the reft of the bone may have a partial rotation. When the thigh-bone refifts the actions of its mufcles more than the trunk of the body can then do, as in ftanding, thefe mufcles have their effect on the trunk, caufing it to bend forward, raifing it up, inclining it to the one or the other fide, twifting it obliquely, &c. which the rolling of the acetabula of the offa innominata on the round heads of the thigh-bones is well fitted for. The os femoris is articulated below to the tibia and rotula in the manner afterwards to be defcribed.

The nearnefs of the fmall neck to the round head of the thigh-bone, and its upper end being covered with very thick mufcles, make greater difficulty in diftinguifhing between a luxation and fracture here, than in any other part of the body.

The

The *LEG* * is composed, according to the common account, of two bones, tibia and fibula, though it seems to have a very good title to a third, the rotula; which bears a strong analogy to the olecranon of the ulna, and moves always with the other two.

TIBIA,† so called from its resemblance to an old musical pipe or flute, is the long thick triangular bone, situated at the internal part of the leg, and continued in almost a streight line from the thigh-bone.

The upper end of the tibia is large, bulbous, and spongy, and is divided into two cavities, by a rough irregular protuberance,‡ which is hollow at its most prominent part, as well as before and behind. The anterior of the two ligaments that compose the great cross one, is inserted into the middle cavity, and the depression behind receives the posterior ligament.

The two broad cavities at the sides of this protuberance are not equal; for the internal is oblong and deep, to receive the internal condyle of the thigh-bone; while the external is more superficial and rounder, for the external condyle. In each of these two cavities of a recent subject, a semilunar cartilage is placed, which is thick at its convex edge, and becomes gradually thinner towards the concave or interior edge. The middle of each of these cartilages is broad, and the ends of them turn narrower and thinner, as they approach the middle protuberance of the tibia.

The thick convex edge of each cartilage is connected to the capsular and other ligaments of the articulation, but so near to their rise from the tibia, that the cartilages are not allowed to change places far; while the narrow ends of the cartilages becoming almost ligaments, are fixed at the insertion of the strong cross ligament into the tibia, and seem to have their substance united with it; therefore a circular hole is left between each cartilage and the ligament, in which the most prominent convex part of each condyle of the thigh-bone moves. The circumference of these cavities is rough and unequal for the firm connection of the ligaments of the joint. Immediately below the edge, at its back part, two rough flatted protuberances stand out; into the internal, the tendon of the semimembranosus muscle is inserted; and a part of the cross ligament is fixed to the external. On the outside of this last tubercle, a smooth slightly-hollowed surface is formed by the action of the poplitæus muscle.

Below the fore part of the upper end of the tibia, a considerable rough protuberance * rises, to which the strong ligament of the rotula is fixed. On the internal side of this, there is a broad scabrous slightly-hollowed surface, to which the internal long ligament of the joint, the aponeurosis of the vastus internus, and the tendons of the seminervosus, gracilis, and sartorius, are fixed. The lowest part of this surface is therefore the place where the tibia ought to be sawed through in an amputation, so as not to have too long and troublesome a stump, and, at the same time, to preserve its motions, by saving the proper muscles. Below the external edge of the upper end of the tibia, there is a circular flat surface, covered in a recent subject with cartilage, for the articulation of the fibula; between which and the anterior knob, there is a rough hollow from which the tibialis anticus, and extensor digitorum longus, take their origin. From the smooth flat surface, a ridge runs obliquely downwards and inwards, to give rise to part of the solæus, tibialis posticus, and flexor digitorum longus, and insertion to the aponeurosis of the semimembranosus which covers the poplitæus, and to some of the external

* Κνημη crus, tibia.

† Προκνημανον, ουτικνημιον, focile majus, arundo major, canna major, canna domestica cruris.

‡ Διαφυσις, ἰξοχη νευροχονδρωδες, tuber, tuberculum.

* Ἀντικνημιον, anterior tuber.

ternal fibres of this last-named muscle. At the inside of this ridge an oblique plain surface is left, where the greatest part of the musculus poplitæus is inserted. The remaining body of the tibia is triangular. The anterior angle is very sharp, and is commonly called the *spine* or *shin*.* This ridge is not streight, but turns first inwards, then outwards, and lastly inwards again. The plain internal side is smooth and equal, being little subjected to the actions of muscles; but the external side is hollowed above by the tibialis anticus, and below by the extensor digitorum longus and extensor pollicis longus. The two angles behind these sides are rounded by the action of the muscles; the posterior side comprehended between them is not so broad as those already mentioned, but is more oblique and flatted by the action of the tibialis posticus and flexor digitorum longus. Some way above the middle of the bone the internal angle terminates, and the bone is made round by the pressure of the musculus solæus. Near to this, the passage of the medullary vessels is seen slanting obliquely downwards.

The lower end of the tibia is made hollow, but so as a small protuberance rises in the middle. The internal side of this cavity, which is smooth, and, in a recent subject, is covered with cartilage, is produced into a considerable process, commonly named *malleolus internus*;† the point of which is divided by a notch, and from it ligaments are sent out to the foot. We ought to observe here, that this internal malleolus is situated more forwards than the internal condyle of the upper end of this bone; which is necessary to be remembered in reducing a fracture of the leg.‡ The external side of this end of the tibia has a rough irregular semilunar cavity formed in it, for receiving the lower end of the fibula. The posterior side has two lateral grooves, and a small middle protuberance. In the internal depression, the tendons of the musculus tibialis posticus and flexor digitorum longus are lodged; and in the external, the tendon of the flexor longus pollicis plays. From the middle protuberance, ligamentous sheaths go out, for tying down these tendons.

The articulations and motions of the tibia shall be explained, after all the three bones of the leg are described.

Both the ends of the tibia are cartilages at birth, and become afterwards epiphyses.

*FIBULA** is the smallest long bone, placed on the outside of the leg, opposite to the external angle of the tibia; the shape of it is irregularly triangular.

The head of the fibula has a superficial circular cavity formed on its inside; which, in a recent subject, is covered with a cartilage, but so closely connected to the tibia by ligaments, as to allow only a small motion backwards and forwards. This head is protuberant and rough on its outside, where a strong round ligament and the musculus biceps are inserted; and, below the back part of its internal side, a tubercle may be remarked, that gives rise to the strong tendinous part of the solæus muscle.

The body of this bone is a little crooked inwards and backwards, which figure is owing to the actions of the muscles; but is still farther increased by nurses, who often hold children carelessly by the legs. The sharpest angle of the fibula is forwards, on each side of which the bone is considerably but unequally depressed by the bellies of the several muscles that rise from or act upon it; and, in old people, these muscles make distinct sinuosities for themselves. The external surface of the fibula is depressed obliquely from above downwards and backwards, by the two peronæi. Its internal

* Ακανθα, spina, crea, linea prima tibiæ, angulus acutus.

† Σφυρόν, πεσσον, talus, clavicula, clavilla interior, clavilla domestica.

‡ Winslow, Exposition anatomique, des os secs, sect. 865.

* Περονιδιον, perone, focile minus, arundo, minor, canna minor, cruris, fura, radius.

internal surface is unequally divided into two narrow longitudinal planes, by an oblique ridge extended from the upper part of the anterior angle, to join with the lower end of the internal angle. To this ridge the ligament stretched between the two bones of the leg is connected. The anterior of the two planes is very narrow above, where the extensor longus digitorum and extensor longus pollicis arise from it; but is broader below, where it has the print of the nonus vesalii. The posterior plane is broad and hollow, giving origin to the larger share of the tibialis posticus. The internal angle of this bone has a tendinous membrane fixed to it, from which fibres of the flexor digitorum longus take their rise. The posterior surface of the fibula is the plainest and smoothest, but is made flat above by the solæus, and is hollowed below by the flexor pollicis longus. In the middle of this surface the canal for the medullary vessels may be seen slanting downwards.

I have taken particular notice of the entry and direction of the medullary vessels of the large bones of the extremities;* because in several chirurgical cases, a surgeon who is ignorant of this, may do mischief to his patient. Thus, for example, if these vessels are opened very near to their entry into the bone, or while they are in the oblique passage through it, an obstinate hæmorrhage may ensue; for the arteries being connected to the bony passage, styptics, and other like corrugators, are vainly applied; compressing instruments can do no service, and ligatures cannot be employed. There seems to be a particular design in the contrivance of these canals; those in the os humeri, tibia, and fibula, running obliquely downwards from their external entry; whereas in the radius, ulna, and os femoris, they slant upwards, whereby the arteries and nerves which are sent into these three last bones, must suffer a considerable reflection before they come at the cancelli. The reason of this diversity may perhaps be, that the arteries which are so small within the bones as to have no strong contractile propelling force in their coats, and where they are not assisted by the action of any moving neighbouring organ, should have, at least in their passage through the bone, a favourable descent for their liquids, which, it is evident, they have in the descending oblique passages formed from them in the first class of bones, to wit, the os humeri, tibia, and fibula, which are generally depending; and they also must frequently acquire the like advantage in the radius, ulna, and os femoris, because the hand, in the most natural posture, is higher than the elbow; and when we sit or lie, the lower end of the thigh bone comes to be at least as high raised as the upper. In standing or walking, when the arms are moved, the blood must indeed ascend as it passes through the bones of the fore arm and thigh; but the pressure of the muscles, then in action, on the vessels, before they enter the bones, is sufficient to compensate the advantage of their course. This reasoning seems to be still enforced, by observing, that this passage is always nearer the upper than the lower ends of these bones.

The lower end of the fibula is extended into a spongy oblong head, on the inside of which is a convex, irregular, and frequently a scabrous surface, that is received by the external hollow of the tibia, and so firmly joined to it by a very thin intermediate cartilage and strong ligaments, that it scarce can move. Below this, the fibula is stretched out into a coronoid process, that is smooth, covered with cartilage on its internal side, and is there contiguous to the outside of the first bone of the foot, the astragalus, to secure the articulation. This process, named *malleolus, externus*, being situated farther back than the internal malleolus, and in an oblique direction, obliges us naturally to turn the

* Havers, Osteolog. nov. disc. 9. p. 51.

the fore part of the foot outwards.* At the lower part of this process, a spongy cavity for mucilaginous glands may be remarked; from its point ligaments are extended to the astragalus, os clacis, and os naviculare, bones of the foot; and from its inside short strong ones go out to the astragalus. On the back part of it a sinuosity is made by the tendons of the peronæi muscles. When the ligament extended over those tendons from the one side of the depression to the other is broke, stretched too much, or made weak by a sprain, the tendons frequently start forwards to the outside of the fibula.

The conjunction of the upper end of the fibula with the tibia is by plain surfaces tipped with cartilage, and at its lower end the cartilage seems to glue the two bones together, not, however, so firmly in young people, but that the motion at the other end of such a long radius is very observable. In old subjects I often see the two bones of the leg grown together at their lower ends.

The principal use of this bone is to afford origin and insertion to muscles; the direction of which may be a little altered on proper occasions, by its upper part shuffling backwards and forwards. It likewise helps to make the articulation of the foot more secure and firm. The ends of the tibia and fibula being larger than their middle, a space is here left, which is filled up with such another ligament as I described extended between the bones of the fore arm; which is also discontinued at its upper part, where the tibialis anticus immediately adheres to the solæus and tibialis posticus; but every where else it gives origin to the muscular fibres.†

Both the ends of this bone are cartilaginous in a ripe child, and assume the form of appendices before they are united to its body.

* Winslow, Memoires de l'acad. de sciences, 1722.

† Weitbrecht, Syndesmolog. p. 156.

*ROTULA** is the small flat bone situated at the fore part of the joint of the knee. Its shape resembles the common figure of the heart with its point downwards. The anterior convex surface of the rotula is pierced by a great number of holes, into which fibres of the strong ligament that is spread over it enter. Behind, its surface is smooth, covered with cartilage, and divided by a middle convex ridge into two cavities, of which the external is largest; and both are exactly adapted to the pulley of the os femoris, on which they are placed in the most ordinary unstraining postures of the leg; but when the leg is much bended, the rotula descends far down on the condyles; and when the leg is fully extended, the rotula rises higher, in its upper part, than the pulley of the thigh bone. The plain smooth surface is surrounded by a rough prominent edge, to which the capsular ligament adheres: below, the point of the bone is scabrous, where the strong tendinous ligament from the tubercle of the tibia is fixed. The upper horizontal part of this bone is flatted and unequal, where the tendons of the extensors of the leg are inserted.

The substance of the rotula is cellular, with very thin external firm plates; but then these cells are so small, and such a quantity of bone is employed in their formation, that scarce any bone of its bulk is so strong. Besides, it is covered all over with a thick ligament (as it was observed that this sort of bones generally is) to connect its substance, and is moveable to one side or other; therefore is sufficiently strong to resist the ordinary actions of the large muscles that are inserted into it, or any common external force applied to it; while a fixed process, such as the olecranon, would not have been sufficient to bear the whole weight of our bodies, which frequently falls on it,

* Ἐπιμυλὶς, μυλακρὶς, κόγχος, ἐπιγονατὶς, πολανηστεδρὸς; patella, mola, genu, scutiform, os, cartilaginosum, disciforme, oculus genu.

it, and would have hindered the rotatory motion of the leg. Notwithstanding these precautions to preserve this bone from such injuries, yet I have seen a transverse fracture in it, when, by the report of the patient, and of the people about him, and by the want of swelling, discolouring, or other mark of bruise or contusion, it was plain the bone was broken by the violent straining effort of the muscles.* Though my patient recovered the use of the joint of the knee, yet I think it reasonable to believe, that this sort of fracture is commonly attended with difficulty of motion, after the broken parts of the rotula are reunited; because the callous matter probably extends itself into the cavity of the joint, where it either grows to some of the parts or makes such an inequality on the surface of this bone, as does not allow it to perform the necessary motions on the condyles of the femur.†

At the ordinary time of birth, the rotula is entirely cartilaginous, and scarcely assumes a bony nature so soon as most epiphyses do.

The parts which constitute the joint of the knee being now described, let us examine what are its motions, and how performed. The two principal motions are flection and extension. In the former of these, the leg may be brought to a very acute angle with the thigh, by the condyles of the thigh-bones being round and made smooth far backwards. In performing this the rotula is pulled down by the tibia. When the leg is to be extended, the rotula is drawn upwards, consequently the tibia forwards by the extensor muscles; which by means of the protuberant joint, and of this thick bone with its ligament, have in effect the cord, with which they act, fixed to the tibia at a considerable angle, therefore act with advantage; but are restrained from pulling the leg farther than to a streight line with the thigh, by the posterior part of the cross ligament, that the body might be supported by a firm perpendicular column; for at this time the thigh and leg are as little moveable in a rotatory way, or to either side, as if they were one continued bone. But when the joint is a little bended, the rotula is not tightly braced, and the posterior ligament is relaxed; therefore this bone may be moved a little to either side, or with a small rotation in the superficial cavities of the tibia; which is done by the motion of the external cavity backwards and forwards, the internal serving as a sort of axis.* Seeing then one part of the cross ligament is situated perpendicularly, and the posterior part is stretched obliquely from the internal condyle of the thigh outwards, that posterior part of the cross ligament prevents the leg's being turned at all inwards; but it could not hinder it from turning outwards almost round, was not that motion confined by the lateral ligaments of this joint, which can yield little. This rotation of the leg outwards is of good advantage to us in crossing our legs, and turning our feet outwards on several necessary occasions; though it is altogether fit this motion should not be very large, to prevent frequent luxations here. While all these motions are performing, the part of the tibia that moves immediately on the condyles is only so much as is within the cartilaginous rings, which, by the thickness on their outsides, make the cavities of the tibia more horizontal, by raising their external side where the surface of the tibia slants downwards. By this means the motions of this joint are more equal and steady than otherwise they would have been. The cartilages being capable of changing a little their situation, are fit for doing this good office in the motions and postures of the member, and contribute to make the motions larger and quicker.

On account of the very large surface of the bones forming the joint of the knee, and the many strong liga-

* See Ruysch. Observ. anat. chirurg obs. 3.
† Pare, liv. 15. cap. 22.

* Winslow, Exposition anatomique du corps humain, traite des os secs. sect. 976.

ments

ments connecting them, luxations seldom happen here. But these very ligaments, the aponeurosis passing over this joint, the quantity of fat and mucilaginous glands necessary for lubricating it, make it more subject to white-swellings, dropsies, and such other disorders, than any other joint of the body.

The *FOOT* is divided, as well as the hand, into three parts, viz. tarsus, metatarsus, and toes; in the description of which, the several surfaces shall be named, according to their natural situation, viz. the broad of the foot, shall be called superior; the sole, inferior; the side on which the great-toe is, internal; that where the little-toe is, external.

The tarsus consists of seven spongy bones; to wit, the astragalus, os calcis, naviculare, cuboides, cuneiforme externum, cuneiforme medium, and cuneiforme internum.

The astragalus is the uppermost of these bones. The os calcis is below the astragalus, and is considerably prominent backwards beyond the other bones to form the heel. The os naviculare is in the middle of the internal side of the tarsus. The os cuboides is the most external of the row of four bones at its fore part. The os cuneiforme externum is placed at the inside of the cuboid. The cuneiforme medium is between the external and internal cuneiform bones, and the internal cuneiform is put at the internal side of the foot.

That the description of these bones may not be immoderately swelled with repetition, I desire, once for all, to observe, that wherever a ridge is mentioned, without a particular use assigned, a ligament is understood to be fixed to it; or where a spongy rough cavity, depression, or fossa, is remarked, without naming its use, a ligament is inserted, and mucilaginous glands are lodged; for such will occur in the detail of each of these bones.

The upper part of the astragalus * is formed into a large smooth head,* which is slightly hollowed in the middle; and therefore resembles a superficial pulley, by which it is fitted to the lower end of the tibia. The internal side of this head is flat and smooth, to play on the internal malleolus. The external side has also such a surface, but larger, for its articulation with the external malleolus. Round the base of this head there is a rough fossa; and, immediately before the head, as also below its internal smooth surface, we find a considerable rough cavity.

The lower surface of the astragalus is divided by an irregular deep rough fossa; which at its internal end is narrow, but gradually widens as it stretches obliquely outwards and forwards. The smooth surface, covered with cartilage, behind this fossa, is large, oblong, extended in the same oblique situation with the fossa, and concave, for its conjunction with the os calcis. The back part of the edge of this cavity is produced into two sharp-pointed rough processes, between which is a depression made by the tendon of the flexor pollicis longus. The lower surface before the fossa is convex, and composed of three distinct smooth planes. The long one behind, and the exterior or shortest, are articulated with the heel-bone; while the internal, which is the most convex of the three, rests and moves a cartilaginous ligament, that is continued from the calcaneum to the os scaphoides. Without which ligament, the astragalus could not be sustained, but would be pressed out of its place by the great weight it supports, and the other bones of the tarsus would be separated. Nor would a bone be fit here, because it must have been thicker than could conveniently be allowed; otherwise it would break, and would not prove such an easy bending base, to lessen the shock which is given to the body in leaping, running, &c.

The fore part of this bone is formed into a convex oblong smooth head,

* Ασραγαλος, talus, balistæ os, malleolus, chaib, quatrio, os sessaræ, clavicula, unciforme.

* Τετραρος.

called

called by ſome its proceſs, which is received by the os naviculare. Round the root of this head, eſpecially on the upper ſurface a rough foſſa may be remarked.

The aſtragalus is articulated above to the tibia and fibula, which together form one cavity. Though in this articulation, the bones have prominencies and cavities ſo ſmall, as might allow motions in all directions; yet the flection and extenſion are the moſt conſiderable, the other motions being confined by the malleoli, and by the ſtrong ligaments which go out from the points of theſe proceſſes to the aſtragalus and os calcis. When the foot is bended, ſo far as it is commonly when we ſtand, no lateral or rotatory motion is allowed in this joint; for then the head of the aſtragalus is ſunk deep between the malleoli, and the ligaments are tenſe; but when the foot is extended, the aſtragalus can move a little to either ſide, and with a ſmall rotation. By this contrivance the foot is firm, when the weight of the body is to be ſupported on it; and when a foot is raiſed, we are at liberty to direct it more exactly to the place we intend next to ſtep upon. The aſtragalus is joined below, to the os calcis; and before, to the os naviculare, in the manner to be explained, when theſe bones are deſcribed.

A conſiderable ſhare of this bone is oſſified in a new-born infant.

Calcaneum * is the largeſt bone of the ſeven. Behind, it is formed into a large knob, commonly called the *heel*; the ſurface of which is rough behind, where the tendo Achillis is inſerted into it; and above, it is hollow and ſpongy. Farther forwards, on the upper ſurface of the calcaneum, there is an irregular oblong ſmooth convexity, adapted to the concavity at the back part of the aſtragalus; and beyond this a narrow foſſa is ſeen, which divides it from two ſmall concave ſurfaces, that are joined to the fore part of the aſtragalus. Behind the poſterior of theſe ſmooth ſurfaces, which is the largeſt, a ſmall ſinuoſity is made by the tendon of the flexor digitorum longus, at the fore part of which a ſmall rough protuberance appears, that gives riſe to the muſculus extenſor digitorum brevis.

The external ſide of this bone is flat, with a ſuperficial foſſa running horizontally, in which the tendon of the muſculus peronæus longus is lodged. The internal ſide of the heel-bone is hollowed, for lodging the origin of the maſſa cornea Jac. Sylvii, and for the ſafe paſſage of tendons, nerves, and arteries. Under the ſide of the internal ſmooth concavity, a particular groove is made by the tendon of the flexor pollicis longus; and from the thin protuberance on this internal ſide, the cartilaginous ligament that ſupports the aſtragalus, goes out to the os naviculare; on which ligament, and on the edge of this bone to which it is fixed, the groove is formed for the tendon of the flexor digitorum profundus.

The lower ſurface of this bone is preſſed flat at the back part, by the weight of our bodies; and immediately before this plane, there are two tubercles, from the internal of which the muſculus abductor pollicis, flexor digitorum ſublimis, as alſo part of the aponeuroſis plantaris, and of the abductor minimi digiti have their origin; and the other part of the abductor minimi digiti and aponeuroſis plantaris riſes from the external. Before theſe protuberances this bone is concave, for lodging the flexor muſcles; and at its fore part we may obſerve a rough depreſſion, from which, and a tubercle behind it, the ligament goes out that prevents this bone to be ſeparated from the os cuboides.

The fore part of the os calcis is formed into an oblong pulley-like ſmooth ſurface, which is circular at its upper external end, but is pointed below. This ſmooth ſurface is fitted to the os cuboides.

Though the ſurfaces by which the aſtragalus and os calcis are articulated, ſeem fit enough for motion; yet the very ſtrong ligaments by which theſe

* Os calcis, πτέρνα, calcar pedis.

these bones are connected, prevent it, and render this principal part of our base, which rests on the ground, to wit, the os calcis, firm.

A large share of the heel-bone is ossified at the ordinary time of birth, and the large knob appears afterwards in form of an epiphyse.

Os naviculare,* is somewhat circular. It is formed into an oblong concavity behind for receiving the anterior head of the astragalus. On the upper surface there is a rough fossa. Below, the os naviculare is very unequal and rough; but hollow for the safety of the muscles. On its inside a large knob rises out, from which the abductor pollicis takes in part its origin, the tendon of the tibialis posticus is inserted into it, and to it two remarkable ligaments are fixed; the first is the strong one, formerly mentioned, which supports the astragalus; the second is stretched from this bone obliquely across the foot, to the metatarsal bones of the middle toe, and of the toe next to the little one. On the outside of the os naviculare there is a semicircular smooth surface, where it is joined to the os cuboides. The fore part of this bone is all covered with cartilage, and is divided into three smooth planes, fitted to the three ossa cuneiformia.

The os naviculare and astragalus are joined as a ball and soket, and the naviculare moves in all directions in turning the toes inwards, or in raising or depressing either side of the foot, though the motions are greatly restrained by the ligaments which connect this to the other bones of the tarsus. A weakness of these ligaments causes sometimes an unnatural turn of the fore part of the foot inwards.

The os naviculare is wholly cartilaginous in a new-born infant.

OS CUBOIDES † is a very irregular cube. Behind, it is formed into an oblong unequal concavity, adapted to the fore part of the os calcis. On its internal side, there is a small semicircular smooth cavity, to join the os naviculare. Immediately before which, an oblong smooth plane is made by the os cuneiforme externum. Below this the bone is hollow and rough. On the internal side of the lower surface, a round protuberance and fossa are found, where the musculus abductor pollicis has its origin. On the external side of this same surface, there is a round knob, covered with cartilage; immediately before which, a smooth fossa may be observed, in which the tendon of the peronæus primus runs obliquely across the foot; and on the knob, the thin flat cartilage proper in this muscle plays; in place of which sometimes a bone is found; more externally than the knob, a rough hollow is made, for the strong ligaments stretched betwixt this bone and the os calcis. Before, the surface of the os cuboides is flat, smooth, and slightly divided into two planes, for sustaining the os metatarsi of the little toe, and of the toe next to it.

The form of the back part of the os cuboides, and the ligaments connecting the joint there with the os calcis, both concur in allowing little motion in this part.

The ossification of this bone is scarcely begun at the birth.

Os cuneiforme externum,* if we regard its situation or medium by its bulk, is much of the shape of a wedge, being broad and flat above, with long sides running obliquely downwards, and terminating in a sharp edge. The upper surface of this bone is an oblong square. The one behind is nearly a triangle, but not complete at the inferior angle, and is joined to the os naviculare. The external side is an oblong square divided as is were by a diagonal; the upper half of it is smooth, for its conjunction with the os cuboides; the other is a scabrous hollow, and in its superior anterior angle a small smooth impression is made by the os metatarsi of the toe next to the little

* Σκαφοειδες. os cymbæ.

† Πολυμορφον cubiforme, quadratum, grandinosum, varium, tessaræ, multiforme.

* Chalcoideum externum.

little one. The internal ſide of this bone is alſo quadrangular with the fore part of its edge made flat and ſmooth where the os cuneiforme medium is contiguous to it. The fore part of this bone is an oblong triangle, for ſuſtaining the os metatarſi of the middle toe.

Os cuneiforme medium, or minimum, is ſtill more exactly the ſhape of a wedge than the former. Its upper part is ſquare; its internal ſide has a flat ſmooth ſurface above and behind, for its conjunction with the following bone, with a ſmall rough foſſa below, and a conſiderable ſhare of it is rough and hollow. The external ſide is ſmooth and a little hollowed, where it is contiguous to the laſt-deſcribed bone. Behind, this bone is triangular, where it is articulated with the os naviculare; and it is alſo triangular at its fore part, where it is contiguous to the os metatarſi of the toe next to the great one.

Os cuneiforme maximum, or internum, differs from the two former in its ſituation, which is more oblique than their's. Beſides, its broad thick part is placed below, and the ſmall thin point is above and outwards; while its under broad ſurface is concave, for allowing a ſafe paſſage to the flexors of the great-toe. The ſurface of this os cuneiforme behind, where it is joined to the os naviculare, is hollow, ſmooth, and of a circular figure below, but pointed above. The external ſide conſiſts of two ſmooth and flat ſurfaces, whoſe direction is nearly at right-angles with each other. With the poſterior, that runs obliquely from below forwards and upwards, the os cuneiforme minimum is joined; and with the anterior, whoſe direction is longitudinal, the os metatarſi of the toe next to the great one is connected. The fore part of this bone is ſemilunar, but flat and ſmooth, for ſuſtaining the os metatarſi of the great-toe. The internal ſide is ſcabrous, with two remarkable tubercles below, from which the muſculus abductor pollicis riſes, and the tibialis anticus is inſerted into its upper part.

The three cuneiform bones are all ſo ſecured by ligaments, that very little motion is allowed in any of them, and they are cartilaginous in a fœtus of nine months.

Theſe ſeven bones of the tarſus, when joined, are convex above, and leave a concavity below, for lodging ſafely the ſeveral muſcles, tendons, veſſels, and nerves, that lie in the ſole of the foot. In the recent ſubject, their upper and lower ſurfaces are covered with ſtrong ligaments which adhere firmly to them, and all the bones are ſo tightly connected by theſe and the other ligaments, which are fixed to the rough ridges and foſſæ mentioned in the preceding deſcription of the particular bones, that, notwithſtanding the many ſurfaces covered with cartilage, ſome of which are of the form of the very moveable articulations, no more motion is here allowed, than only to prevent too great a ſhock of the fabric of the body in walking, leaping, &c. by falling on too ſolid a baſe; which, if it was one continued bone, would likewiſe be much more liable to be broken; and in order to make our foot accommodate itſelf to the ſurfaces we tread on, by becoming more or leſs hollow, or by raiſing or depreſſing either ſide of it, as might be judged by what was ſaid of the particular bones.

Sprains here occaſion, as in the wriſt, great pain and obſtinate tumours, which too often cauſe carious bones.

*METATARSUS** is compoſed of five bones, which, in their general characters, agree with the metacarpal bones; but may be diſtinguiſhed from them by the following marks: 1. They are longer, thicker, and ſtronger. 2. Their anterior round ends are not ſo broad, and are leſs in proportion to their baſes. 3. Their bodies are ſharper above, and flatter on the ſides, with their inferior ridge inclined more to the outſide. 4. The tubercles at the

* Στῆθος, πεδίον. planta, planum, veſtigium, ſolium, pectus, præcordium, pectuſculum.

the lower parts of the round head are larger.

The first or internal metatarsal bone is easily distinguished from the rest by its thickness. The one next to it is the longest, and with its sharp edge almost perpendicular. The others are shorter and more oblique, as their situation is more external. Which general remarks, with the description I am now to give of each, may teach us to distinguish them from each other.

Os metatarsi policis is by far the thickest and strongest, as having much the greatest weight to sustain. Its base is oblong, irregularly concave, and of a semilunar figure, to be adapted to the os cuneiforme maximum. The inferior edge of this base is a little prominent and rough, where the tendon of the peronæus primus muscle is inserted. On its outside an oblique circular depression is made by the second metatarsal bone. Its round head has generally on its fore part a middle ridge, and two oblong cavities, for the ossa sesamoidea; and on the external side a depression is made by the following bone.

Os metatarsi of the second toe, is the longest of the five, with a triangular base supported by the os cuneiforme medium and the external side produced into a process; the end of which is an oblique smooth plane, joined to the os cuneiforme externum. Near the internal edge of the base, this bone has two small depressions, made by the os cuneiforme maximum, between which is a rough cavity. Farther forwards we may observe a smooth protuberance, which is joined to the foregoing bone. On the outside of the base are two oblong smooth surfaces, for its articulation with the following bone; the superior smooth surface being extended longitudinally, and the inferior perpendicularly; between which there is a rough fossa.

Os metatarsi of the middle toe, is the second in length. Its base, supported by the os cuneiforme externum, is triangular, but slanting outwards, where it ends in a sharp-pointed little process; and the angle below is not completed.

The internal side of this base is adapted to the preceding bone; and the external side has also two smooth surfaces covered with cartilage, but of a different figure; for the upper one is concave, and, being round behind, turns smaller as it advances forwards; and the lower surface is little, smooth, convex, and very near the edge of the base.

Os metatarsi of the fourth toe, is near as long as the former, with a triangular slanting base joined to the os cuboides, and made round at its external angle, having one hollow smooth surface on the outside, where it is pressed upon by the following bone, and two on the internal side, corresponding to the former bone; behind which is a long narrow surface impressed by the os cuneiforme externum.

Os metatarsi of the little toe, is the shortest, situated with its two flat sides above and below, and with the ridges laterally. The base of it, part of which rests on the os cuboides, is very large, tuberous, and produced into a long-pointed process externally, where part of the abductor minimi digiti is fixed; and into its upper part the peronæus secundus is inserted. Its inside has a flat conoidal surface, where it is contiguous to the preceding bone.

When we stand, the fore ends of these metatarsal bones, and the os calcis, are our only supporters; and therefore it is necessary they should be strong, and should have a confined motion.

The bones of the *TOES* are much a-kin to those of the thumb and fingers; particularly the two of the great toe are precisely formed as the two last of the thumb; only their position, in respect of the other toes, is not oblique; and they are proportionally much stronger, because they are subjected to a greater force; for they sustain the force with which our bodies are pushed forwards by the foot behind at every step we make; and on them

them principally the weight of the body is supported, when we are raised on our tip-toes.

The three bones in each of the other four toes, compared to those of the fingers, differ from them in these particulars. They are less, and smaller in proportion to their lengths. Their bases are much larger than their anterior ends; their bodies are more narrow above and below, and flatter on the sides. The first phalanx is proportionally much longer than the bones of the second and third, which are very short.

Of the four, the toe next to the great one, has the largest bones in all dimensions, and more externally the toes are less. The little toe, and frequently that next to it, have the second and third bones intimately united into one; which may be owing to their little motion and the great pressure they are subjected to.

The toes are of good use to us in walking; for, when the sole is raised, they bring our body, with its centre of gravity, perpendicular to the advanced foot.

The bones of the metatarsus and toes, are in the same condition in children as those of the metacarpus and fingers.

The only bones now remaining to complete the description of the skeleton, are the small ones, which are found at the joints of the fingers and toes, and in some other parts, called, *OSSA SESAMOIDEA*, which are of very different figures and sizes, though they are generally said to resemble the seed of the sesamum. They seem to me nothing else than the ligaments of the articulations, or the firm tendons of strong muscles, or both, become bony, by the compression which they suffer. Thus the sesamoid bones at the beginning of the gastrocnemii muscles, are evidently composed of the tendinous fibres only. These, at the first joint of the great-toe, are as plainly the same continued substance with the ligaments, and the tendons of the adductor, flexor, brevis, and abductor. That which is sometimes double at the second joint of that toe, is part of the capsular ligament; and if we enumerate the other sesamoid bones that are at any time found, we may observe all of them formed in this manner. Their number, figure, situation, and magnitude, are so uncertain, that it were in vain to insist on the differences of each; and therefore I shall only in general remark.

1. That wherever the tendons and ligaments are firmest, the actions of the muscles strongest, and the compression greatest, there such bones are most commonly found.

2. That, *cæteris paribus*, the older the subject is in which they are sought, their number is greater, and their size is larger.

3. The more labour any person is inured to, he has, *cæteris paribus*, the most numerous and largest ossa sesmoidea.

However, as the two at the first joint of the great-toe are much larger than any other, are early formed, and are seldom wanting in an adult, we may judge, that besides the more forcible cause of their formation, there should also be some particular advantage necessary at this place, rather than elsewhere, which may possibly be, to allow the flexor muscles to send their tendons along this joint, secure from compression in the hollow between the two oblong sesamoid bones; while, by removing these tendons from the centre of motion, and giving them the advantage of an angle at their insertion, the force of the muscles is increased, and therefore the great superincumbent weight of our body in progression is more easily raised.

APPENDIX.

APPENDIX.

OF THE MARKS OF A FEMALE SKELETON.

TO finish the description of the bones is generally to conclude the osteology; but that no part of the subject may be left untouched, I think it necessary to subjoin the distinguishing marks of the male and female skeletons; and have chosen to illustrate them principally in the latter; because women having a more delicate constitution, and affording lodging and nourishment to their tender fœtuses, till they have sufficient strength and firmness to bear the injuries of the atmosphere, and contact of other more solid substances, their bones are frequently incomplete, and always of a make in some parts of the body different from those of the robust male; which agree to the description already given, unless where the proper specialities of the female were particularly remarked; which could not be done in all places where they occur, without perplexing the order of this treatise; therefore I chose rather to sum them up here by way of Appendix.

The causes of the following specialities of the female bones may be reduced to these three: 1. A weak lax constitution. 2. A sedentary inactive life, increasing that constitution. 3. A proper frame for being mothers.

The bones of women are smaller in proportion to their length than those of men; because the force of their muscles is not so great, nor is such strong external force applied to them to prevent their stretching out in length.

The depressions, ridges, scabrous surfaces, and other inequalities made by the muscles, are not so conspicuous in them; because their muscles are neither so thick nor strong, nor so much employed, to make so strong prints on their bones.

Their os frontis is more frequently divided by a continuation of the sagittal suture, which depends on the first and second general causes assigned above for the specialities in their bones; as will appear after reflecting on the account given formerly of the middle internal spine of this bone.

Their clavicles are less crooked; because their arms have been less forcibly pulled forwards, which in European women, especially those of distinction, is more hindered by their garb.

Their sternum is more raised by long cartilages below, that the thorax might be there widened in some proportion to what it is shortened by the pressure upon the diaphragm, when they are with child.

The defect of the bone, or the hole in the middle of the sternum, is oftenest found in them, to allow the passage of the mammary vessels, say some; but, in my opinion, this is owing to a lax constitution, by which the ossification is not so soon com-

pleted as in men, where the action of the ſolids is vigorous, and the circulation of the fluids is briſk; for a much ſmaller hole might have ſerved this purpoſe; and the branches of the internal mammary veſſels which are ſent to the external part of the thorax, do not paſs here, but between the cartilages of the ribs, before theſe are joined to the ſternum.

The cartilago xiphoides, is oftener bifurcated in women than in men, for the reaſon aſſigned in the preceding paragraph, viz. a leſs forcible power of oſſification.

The ſuperior cartilages of the ribs ſooner oſſify, to ſupport the weight of the mammæ.

The middle cartilages are more flat and broad by the weight of the breaſts.

The inferior cartilages are longer, for enlarging the cheſt.

Weak women who have boren many children when young, often have the vertebræ of the back bended forwards, and their ſternum depreſſed, or become round-ſhouldered and flat-breaſted,* by the preſſure and weight of the impregnated uterus, and by the ſtrong action of the abdominal muſcles.

The os ſacrum is broader and turned much more backwards, for enlarging the pelvis.

The os coccygis is more moveable, and much leſs bended forwards, to facilitate the birth.

The oſſa ilium are more hollow, and more reflected outwards, and conſequently farther removed from each other, in order to widen the lower part of their abdomen, and for the better ſupport of the impregnated uterus.

The ridge on the upper part of the oſſa pubis, is larger in ſuch women as have boren children, being extended by the ſtrong action of the muſculi recti abdominis.

The cartilage between the two oſſa pubis, eſpecially in women who have boren children, is thicker than in men, by which the pelvis is more capacious in females.

The conjoined ſurfaces of the oſſa pubis, and of the oſſa innominata and ſacrum, are leſs, the angle under the ſymphyſis of the oſſa pubis, is much larger, and the arches formed below and behind by the oſſa ilium and iſchium are wider, which, with the ſtreighter os ſacrum, and more diſtant tubera iſchii, leave a larger paſſage for the excluſion of the child in birth.

The great tuberoſity of the oſſa iſchium, is flatter in women than in men, becauſe it is more preſſed upon in the ſedentary life which females enjoy.

In conſequence of the pelvis of women being wider, the articulations of their thigh-bones muſt be farther removed from each other; and therefore a larger ſpace is left for the procreation and birth of children;* which diſtance of the thighs may be one reaſon why women in running generally ſhuffle more from one ſide to the other than men, to preſerve the centre of gravity of their bodies from falling too far to a ſide of the joint of the thigh that ſupports them when the other is raiſed, which would endanger their tumbling to the ground.

* Cheſelden, Anatomy, book 1. chap. 3.

* Albin de oſſib. ſect. 339.